

January 17, 2020

Annie Sawabini Department of Ecology, Water Resources Program PO Box 47600 Olympia, WA 98504-7600

RE: Comments on Nooksack Instream Flow Rule, Chapter 173-501 WAC

Dear Ms. Sawabini:

Washington REALTORS® represents the interests of over 20,000 REALTORS® and their clients in Washington State. We appreciate the opportunity to submit comments on the Washington Department of Ecology's ("Ecology") proposed amendments to Chapter 173-501 WAC, the Nooksack Instream Flow Rule.

Over the past 20 years, the issue of rural water availability has significantly impacted the real estate market and homeowners in many parts of Washington State. Our state's near obsession with exempt wells has resulted in a regulatory system that is costly and complicated. The financial and human resources and legal complexity associated with exempt wells has been disproportionate to their water resource impact. Or as said in the song *Juice* by Lizzo, "the juice ain't worth the squeeze."

Much of this complexity has been caused by Ecology's instream flow rules. Implementation of ESSB 6091 is an opportunity to reduce regulatory complexity that provides no commensurate water resource benefit. In reversing the Hirst decision, the Legislature provided a record amount of capital funding. Projects, not regulations, are the best path to protect and restore instream flows. REALTORS® ask that Ecology strive to create a simply regulatory structure with the end users in mind – people who own or buy vacant land in rural areas, REALTORS® who assist them in this process, homebuilders, homeowners, and counties.

We have prepared more detailed comments included with this letter, as well as technical and other documents to be included in the rulemaking record. If you have further questions, please contact Bill Clarke at (360) 561-7540.

Sincerely,

Kitty Wallace Kitty Wallace, 2020 President Washington REALTORS®

Enc.

# 1. The Rule Creates an Overly Complicated System That Increases the Amount of Time, Money, and Human Resources Devoted to Analyzing and Regulating Small Water Uses (That Will be Offset Anyway)

Over the past 20 years, the increasingly complexity of Ecology's instream flow rules on exempt wells has created significant problems for landowners, local governments, and agency itself – all without a commensurate water resource benefits. The implementation of ESSB 6091 is an opportunity to end this trend, and redirect water resource efforts toward more significant issues. Under ESSB 6091, the consumptive use from new domestic exempt wells will be entirely offset by projects within the Nooksack Basin – so why both offset consumptive use projections AND create a complicated regulatory system?

Ecology's proposed rule would establish a number of different limits, under different situations, that unnecessarily limit homeowners and that neither Ecology or local governments are or should be staffed or funded to implement in a meaningful way. For example, the rule proposes a <u>daily</u> gallon per day limit of 500 gallons per day – as opposed to a much simpler to implement metric of a maximum average annual withdrawal, used by the Legislature in ESSB 6091. RCW 90.94.020(5)(f)(ii). The proposed rule limits outdoor irrigation to  $1/12^{\text{th}}$  of an acre per single domestic connection.

These limits are far lower than those adopted by the Legislature in ESSB 6091, and far less than what a reasonable homeowner may need to use. Further, Ecology's rule analysis compares the proposed Nooksack limits to those in other recent Ecology instream flow rules (Stillaguamish, Entiat, Quilcene, etc.). The significant difference is that in the Nooksack Basin under ESSB 6091, all new domestic exempt use will be offset through instream flow projects. In the other WRIA rules used for comparison by Ecology, there is no such equivalent provision. And ironically, Ecology's rule analysis does mention, let alone analyze, its most recent adopted instream flow rule, Chapter 173-557 WAC, for the Spokane River. In that rule, Ecology adopted a far simpler rule structure without domestic exempt well limits and instead acquired water rights to offset future projected exempt well consumptive uses.

The drought limits also create complexity, especially given the increasing occurrence of declared droughts in Washington State. Outdoor irrigation can be curtailed during a declared drought, but only to the extent that the outdoor irrigation is not "subsistence gardening." That likely means that lawns, flowers, and non-fruit bearing bushes and trees could not be irrigated, but food-bearing crops could still be irrigated in a drought. Taken together, this means that by adopting such a proposed rule, Ecology is creating the expectation that it will meaningfully enforce the variety of limits during non-drought and drought conditions on new domestic exempt wells.

If Ecology's objective is to reduce consumptive outdoor water by exempt wells, its priority should be on those exempt well users whose outdoor use exceeds the  $\frac{1}{2}$  acre noncommercial lawn and garden limit in RCW 90.44.050. The irrigation acreage analysis provided to Ecology by RH2 Engineering shows that 34% of homes built between 2000 and 2014 have no outdoor irrigation at all; and that if irrigation over  $\frac{1}{2}$  acre was eliminated, the mean area irrigated by homes built during this time period would be only .18 acres, about 1/3 of what could be lawfully irrigated under the  $\frac{1}{2}$  acre non commercial lawn and garden limit in RCW 90.44.050.

## 2. The Rule Analysis Greatly Overestimates the Impact to Instream Flows Associated With New Domestic Exempt Wells.

Ecology's rule analysis greatly overestimates the impact of new exempt wells on instream flows by improperly focusing solely on the quantity of water <u>withdrawn</u> from new exempt wells, rather than calculating the actual <u>impact</u> on instream flows.

One of the purposes of ESSB 6091 was to offset impacts to instream flows that may occur over the next 20 years. The statute is replete with some version of the phrase "impacts to instream flows" – see RCW 90.94.020(1) (... "potential impacts on a closed water body and potential impairment to an instream flow are authorized ... "); .020(4)b) ("... those actions ... necessary to offset potential impacts to instream flows ... ") The statute is not focused narrowly on the quantity of water withdrawn from wells, but rather, more broadly on impacts to instream flows *associated with* permit-exempt domestic water use."

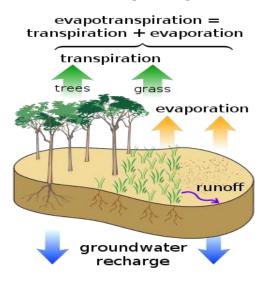
In contrast, Ecology's proposed rule, and related documents focus narrowly on the withdrawal from the well, not the impacts on instream flows. For example, the Ecology document "Recommendations for Water Use Estimates" document states: "ESSB 6091 requires offsetting the quantity of water consumptively used by future domestic permit-exempt wells . . . " (Page 4). The statute is not tied narrowly to water "used by" the well as Ecology's document states – the statutory phrase is "impacts to instream flows "associated with" permit-exempt domestic water use.

So, what is the actual, factual, "impact" over 20 years that is "associated with" domestic water use on instream flows? As to this question, Ecology's proposed rule and related guidance documents presume only those actions that will <u>increase</u> the "impact" on instream flows – but reject or ignore those actions that will reduce the instream flow impacts.

In the construction of a new house, there will typically be the removal of existing vegetation, and the consequential reduction in water use. This will occur in those areas needed for the driveway, septic drainfield, building footprint, and other structures. Ecology's acknowledged this reality in the Water Use Spreadsheet from one of its "Net Ecological Benefit (NEB) Workshop, as the water use projections stated: "\*\* Does not take

into account direct and indirect impacts of property development – tree removal, impervious surfaces, stormwater control regulations."

In the pre-development condition, vacant land will have a certain amount of consumptive water use, depending on the type of vegetation on site. Some of this vegetation (and thus the consumptive use associated with the vegetation) will be permanently removed as part of the home construction process. For example, if the diagram below represents a building parcel in the pre-development condition, home construction might eliminate 1/3 of the existing vegetation, and replace those areas with impervious surfaces that would have zero evapotranspiration:



An additional way that the "impact" to instream flows is being overestimated is lack of recognition of well depth. The removal of vegetation that occurs during development will reduce shallow groundwater use. In contrast, groundwater wells are much deeper than the root zone, and so will withdraw water that recharges shallower aquifers through septic return flows. In some cases, water is provided to shallow groundwater areas that contribute to streamflow only because of the withdrawal by the well and septic recharge.

This combined effect of reduced vegetative evapotranspiration and deep-to-shallow recharge has been documented. For example, see USGS Conceptual Model and Numerical Simulation of the Groundwater-flow System of Bainbridge Island, Washington (2011) https://pubs.usgs.gov/sir/2011/5021/. The USGS document stated as follows:

"The calibrated model was used to simulate predevelopment conditions, during which no groundwater pumping or secondary recharge occurred and currently developed land was covered by conifer forests. Simulated water levels in the uppermost aquifer generally were slightly higher at the end of 2008 than under predevelopment conditions, likely due to increased recharge from septic system returns and decreased evapotranspiration due to reduced forest land cover." (Page 91) (Emphasis Added)

## 3. Robinson & Noble Analysis re: Water Balance "Associated With" Rural Development

Further, during the period of time after the Hirst decision, but prior to passage of ESSB 6091, some counties required additional analysis of water use associated with rural residential development. An example of this is in the attached water balance analysis provided by Robinson & Noble for an actual single-family residential development in Pierce County. The analysis calculates all changes in consumptive water use from the "predevelopment" to "post-development" condition and estimates that the post-development condition will cause an increase in groundwater recharge of 485 gallons per day. This analysis is summarized in the report as follows:

"In the post-development condition, groundwater use from the planned well is partially offset by the infiltration of septic return flow and the partial infiltration of water used outside the home. The decrease in evapotranspiration of the developed area of the property, when coupled with the decreased runoff and increased infiltration capacity of the amended soils, will result in an increased to the amount of water recharging the subsurface. The resulting water balance of this project entirely offsets the consumptive use from the proposed well on the property and provides an increase in recharge as a result of the post-development condition." (Page 8)

Robinson & Noble – Pierce County/Sullivan Project Water Balance Analysis (Attachment A)

Robinson & Noble also prepared a similar analysis for Washington REALTORS®, based on an actual development in Thurston County. (*Water Balance Analysis, Typical Rural Large Lot Residential Developments in Western Washington,* Attachment B) This analysis is based on an actual 10-lot, 50 acre development. For this analysis, the area of forested/vegetation cover and associated consumptive water use was calculated in the predevelopment condition, and compared to the area of outdoor irrigation and associated consumptive use, assumed indoor water use, and septic recharge. The analysis includes both a "high water use" scenario, based on assumptions developed by Ecology as part of the ESSB 6091 implementation, and a "moderate water use" scenario based on other reports (Culhane & Nazy, 2015; Golder, 2011).

For each lot, under the high water use scenario, groundwater recharge in the post-development condition increases by 277 gallons per day. In the moderate water use scenario, groundwater recharge increased by 1,041 gallons per day at each lot. The conclusion of the water balance analysis was summarized by Robinson & Noble as follows:

"In the post-development condition, groundwater use from the planned well is partially offset by the infiltration of septic return flow and the partial infiltration of water used outside the home. The decrease in evapotranspiration of the developed area of the property, when coupled with the decreased runoff and increased infiltration capacity of the amended soils, results in an increase in the amount of water recharging the subsurface. Our analysis suggests that the resulting water balance of the project like this, under either water use scenario, more than completely offsets the consumptive use from the proposed well on the property, providing an increased amount of groundwater recharge under the post-development condition."

(Water Balance Analysis, Typical Rural Large Lot Residential Developments in Western Washington, Page 5 – 6) (Emphasis Added)

REALTORS® are not asking that the reduced water uses associated with vegetation removal be afforded any legal status as mitigation, or suggesting deforestation as a instream flow restoration strategy. Rather, if ESSB 6091 requires calculating and off-setting the "consumptive use impacts to instream flows associated with permit-exempt domestic water use" (RCW 90.94.020(4)(b)), then all actions – those that both increase and decrease groundwater use – should be part of the calculation. This more holistic and hydrologically honest framework would great decrease the supposed "impact" (and in some cases show a benefit) to instream flows – thereby supporting a rule amendment that more closely reflects water needs of rural residents.

## 4. The Proposed Outdoor Use Limits Conflict With Legislative Intent, and Further the Trend of a Complicated and Hard to Implement Water Resource System

RCW 90.94.020(8) states "This section only applies to new domestic groundwater withdrawals exempt from permitting under RCW 90.44.050 . . . . " Under RCW 90.44.050, the exemption for single or group domestic use is one of four separate exemptions. One of the other exemptions in RCW 90.44.050, and one explicitly excluded from RCW Chapter 90.94, is for the irrigation of  $\frac{1}{2}$  acre non-commercial lawn or garden. Ecology's proposed rule conflicts with RCW 90.94.020(8) by including outdoor irrigation limits ( $\frac{1}{12^{th}}$  of an acre) with the domestic limit of 500 gallons per day. In addition to conflicting with RCW Chapter 90.94, Ecology's "bundled" interpretation of RCW 90.44.050, combining multiple exempt uses into a single exemption, was rejected by the Washington Supreme Court in the Five Corners Family Farmers decision.

In that case, the Court stated:

With collapse of the "bundle" interpretation, [Ecology's] argument that permit-exempt stock-watering withdrawals are limited to 5,000 gallons per day also fails. Accepting, as the sentence structure makes clear, that the exemption clause contains four distinct categories, it becomes apparent that each category is limited by its own qualifying language and only its own qualifying language. Given that the "five thousand gallons a day" limitation appears twice in the exemption clause, it is evident that the legislature knew how to attach that limitation to multiple categories, and yet it chose only to apply it to two categories. There is simply no textual basis for the conclusion that "five thousand gallons a day" modifies "for stock-watering purposes." RCW 90.44.050. Accordingly, Appellants' proposed interpretation is not reasonable.

*Five Corners Family Farmers v. Ecology*, 173 Wn.2d 296, 312–13 (2011).

By including outdoor irrigation limits, which cannot be attributed to any authority in RCW Chapter 90.94, Ecology is using the same "bundled" interpretation of RCW 90.44.050 rejected by the Supreme Court.

Further, beyond the legal interpretation, the 1/12<sup>th</sup> acre provision is an example of a regulatory provision that creates unnecessary complexity over a few small amount of water (and again, based on the Robinson & Noble analysis, perhaps even positive increases to groundwater recharge associated with new development). In the case of group domestic use, the total outdoor use is limited to ½ acre, regardless of the size of the group use.

Another example of unnecessary complexity is the drought curtailment provision in proposed WAC 173-501-065. In the event of drought, the rule would Ecology to determine whether outdoor uses are "noncommercial subsistence gardening purposes" – as opposed to (we assume?) lawns, trees, shrubs or gardens that are not necessary for subsistence. In drought events, Ecology should focus its efforts on larger water resource issues – both instream and out-of-stream, and not adopt regulations on homeowners whose impacts during normal or drought years are immeasurable.

#### 5. Ecology's Proposed Rule Inconsistent With WDOH Group B Water System Rule

While the proposed amendments describe potential group domestic use, it is unclear whether the 500 gallon per day water use limit would even allow group domestic use. If not, this will result in the need to drill more wells, rather than fewer wells. The Washington Department of Health's Group B rule includes a water supply minimum source capacity of 750 gallons per day, per dwelling unit, for Whatcom County. WAC 246-291-125(4)(d), Table 1.

Washington REALTORS® suggest that 750 gallons per day, average annual use, for indoor use be the minimum quantity allowed under Ecology's amended rule. This would ensure consistency with WDOH's Group B, and ensure sufficient domestic water supply for larger families. Outdoor water use would be allowed in addition to this 750 gallon per day average annual use limit.

In addition, the change from ESSB 6091 in establishing gallon per day limits on an average annual basis, to having a daily 500 gallon per day maximum, further complicates the rule. An average annual GPD limit is easier to understand, implement, and enforce.

#### 6. Ecology's Proposed Rule Inconsistent With GMA Rural Element

Ironically, Ecology's proposed rule is the product of the GMA decision (Hirst), overruled by the Legislature (ESSB 6091), and now ultimately resulting in an Ecology rule that is inconsistent with the GMA – which is exactly where this whole mess started. Under the GMA, "rural character" is defined to include patterns of land use "that foster traditional rural lifestyles, rural-based economies, and opportunities to both live and work in rural areas. RCW 36.70A.030(20)(b). The Department of Commerce's GMA rules further define the Rural Element of the GMA at WAC 365-196-425.

Whatcom County's GMA Comprehensive Plan states as follows:

"Whatcom County's rural lifestyle is one where residents enjoy views of a green landscape dotted by homes and barns, and have an appreciation for clean water and air. Residents can work and shop in small rural communities, or earn a living on their own rural lands, but these enterprises do not detract from the overall sense of openness and predominance of the landscape in the rural area. Rural Whatcom County has long been a place to raise children with the values of hard work and responsible stewardship of the land, and where residents can grow food and livestock for themselves or for market. While rural property owners do not expect to be provided with urban-level services, they enjoy a quality of life and sense of self-sufficiency not ordinarily found in the urban areas."

The "traditional rural lifestyles" that the GMA describes necessitate sufficient water supply for outdoor water use – not  $1/12^{th}$  of an acre. Many people choose to live in rural areas so they have space – space for lawns, gardens, trees, animals, and other pursuits – all of which require outdoor water use. The analysis provided to Ecology by RH2 analyzing outdoor water use shows that on average, homeowners stay well under the ½ acre outdoor lawn and garden limit in RCW 90.44.050. Homeowners should be given this flexibility to irrigate up to ½ acre, and with realistic projections of actual water use impacts, this amount can be offset through projects funded by the Legislature.

#### Attachments:

- A. Robinson & Noble Pierce County/Sullivan Project Water Balance Analysis.
- B. Robinson & Noble Water Balance Analysis, Typical Rural Large Lot Residential Developments in Western Washington.

# WASHINGTON REALTORS TYPICAL RURAL LARGE LOT RESIDENTIAL DEVELOPMENTS IN WESTERN WASHINGTON

NOVEMBER 29, 2018

by

Michael F. Piechowski, LHG Principal Hydrogeologist



# Water-Balance Analysis Typical Rural Large Lot Residential Developments in Western Washington November 29, 2018

#### Introduction and Scope

This narrative has been prepared for Bill Clarke and Washington REALTORS® documenting our water-balance analysis of typical rural large-lot residential developments in Western Washington. This evaluation is based on our analysis of an existing development in Thurston County (County) with ten adjacent 5-acre parcels and focuses on the changes to the total water balance as a result of development. This example is considered to have pre- and post-development conditions that are typical of rural, exempt well-based development in much of Western Washington.

Our approach used aerial imagery available from Thurston County and through Google Earth. We traced the outlines of the homes, driveways, roads, and cleared areas on each of the ten parcels, then calculated the relative areas of each parcel that changed from pre-development conditions (which appeared to be a second-growth forest based on the earliest aerial imagery reviewed). For this discussion, we presumed that each of the homes is served by an individual well and individual on-site septic system and calculated water use based on recent census data and regional studies.

#### Site Setting and Topography

The study area is located near the northern margin of the Maytown Upland in Thurston County, south of Tumwater. The study area is situated on the southern margin of a small upland. The upland has an undulatory surface that was sculpted by the most recent continental glaciation. The features in this area generally trend from the north-northeast to the south-southwest, with lineations corresponding to the presumed direction of glacial motion. According to the USGS topographic quadrangle of the area, the site has an elevation of approximately 370 feet along the northern margin; the elevation steadily drops to 310 feet at the southern boundary of the study area.

General drainage patterns in the area tend to follow the local topography. This portion of the upland containing the study area generally slopes to the south, so surficial drainage generally flows to the south. The slope is relatively gentle, with approximately five feet of drop per hundred feet.

#### Surface Water

The site is located in Water Resource Inventory Area 23, specifically within the Salmon Creek basin. The local surface water drainage is towards the south, but shifts to a more westerly direction approximately one mile south of the site. The nearest significant surface water is Pitman Lake, approximately 5,600 feet to the south. The nearest significant surface stream is the Deschutes River which is approximately 1.5 miles to the east of the property. However, the USGS quadrangle indicates a number of marshy areas in the low-lying regions to the south of the site and ephemeral tributary creeks to Salmon Creek beginning approximately 1,000 feet

east and west of the property. Salmon Creek is a tributary to the Black River, which flows into the Chehalis River, ultimately discharging to the Pacific Ocean at Grays Harbor.

#### Soils and Vegetation

The study area is mostly covered with Alderwood gravelly sandy loam with 8 to 15 percent slopes; a small portion of the site near the southern boundary has steeper slopes (US Department of Agriculture, Soil Conservation Service). The Alderwood gravelly sandy loam is a moderately well-drained soil. It forms on the top of glacial drift and generally has a dense low-permeability layer that restricts infiltration within 39 inches of land surface. This soil is considered to be a part of Hydrologic Group B and is not considered a hydric soil.

#### Site Geology

Site geology was determined by reviewing published geologic maps of the region. Logan (2009) mapped the site and surrounding area as Vashon till, which is a highly-compacted mixture of sand, gravel, silt, and clay that was deposited beneath and overridden by the latest continental glaciation. Typically, till has a relatively low permeability, though it may vary locally based on the composition and the degree of compaction. Review of nearby water well reports suggests that the till is generally over 50 feet thick in the area.

#### Water Balance Analysis

To assess potential post-development changes to the water balance of the groundwater and surface water systems in the area, we completed a water-balance evaluation of the property and proposed development on an annualized basis. This analysis concentrated on the changes to the property from the pre-development conditions (mature second-growth forest). We analyzed two water use scenarios.

The first water use scenario is based on the Washington State Department of Ecology (Ecology) guidance document, ESSB 6091 Streamflow Restoration Recommendations for Water Use Estimates. The water use estimates from Ecology's ESSB 6091 guidance document are higher than other water use estimates used by Ecology or in other studies, but are used for purposes of this analysis as the "High Water Use Scenario." Under the High Water Use Scenario, Ecology uses an average value of 60 gallons of indoor water use per day (gpd) per capita, a household size of 2.5 persons, and consumptive use of 10%. This results in 0.017 acre-feet per year (AF/year) of indoor consumptive water use. Ecology uses a figure of 0.39 AF/year of outdoor consumptive water use. This totals 0.407 AF/year of consumptive use, which averages to 363 gallons per day.

The second water use scenario is based on water use estimates that more closely track prior Ecology water use estimates, though are still conservative and so would tend to overestimate, rather than underestimate, consumptive water use. The second scenario is referred to in the analysis as "Moderate Water Use Scenario." Under this second scenario, water use is based on an average value of 66 gallons of indoor water use per day (gpd) per capita (Welch, 2014). Welch (2014) estimates outdoor water use per capita at 4, 29, 60, 86, 97, and 30 gpd for May, June, July, August, September, and October, respectively. Outdoor water use is presumed to be zero gpd per capita for the rest of the year. The Ecology guidance document uses 2.5 people per residence, so we used that same value in the Moderate Water Use Scenario. This value is consistent with the US Census, which calculated an average of 2.54 persons per household in Thurston County. The per-capita water use numbers listed above were multiplied by 2.5 to calculate total household use. With indoor consumptive use of 10% and outdoor consumptive use

Page 2 3321-001A Robinson Noble, Inc.

of 80%, the moderate water use scenario uses 0.018 AF/year as consumptive indoor use and 0.057 AF/year as outdoor consumptive use, for a total annual consumptive use of 0.076 AF/year, or about 68 gallons per day on average.

Under both scenarios, we presumed that water was withdrawn from a single private well on each parcel, with waste water dispersed via an on-site septic system for each parcel. The total water use (includes both consumptive and non-consumptive uses) in the Moderate Water Use Scenario is 0.25 AF/year. The daily use amounts in this scenario are approximately double those presented in Culhane and Nazy (2015) and Golder (2013), but these amounts were used in order to complete a conservative analysis. The total water use under the High Water Use Scenario, based on the ESSB 6091 Guidance Document is 0.67 AF/year, which is over 2.5 times more than the Moderate Use Scenario, and approximately five times that presented in Culhane and Nazy (2015) and Golder (2013).

Culhane and Nazy (2015) state that indoor use is only 10% consumptive, the remaining 90% is returned via septic infiltration, and that residential outdoor use is considered to be 80% consumptive, with 20% returned via infiltration. Other sources, such as Savoca (2010) suggest outdoor return flow can be as high as 40%. To stay conservative in our approach, we used the 80% consumptive value.

We used information presented in Drost (1999) to determine the rainfall and infiltration rate of the site. Based on information presented in Figures 4, 16, and 17 of Drost (1999), the study area receives 48 inches of rainfall, with 18 inches of that resulting in recharge to the aquifers beneath the site.

In a typical large-lot residential development, a portion of the lot is cleared for development and a home and driveway are constructed, adding impermeable surfaces to the property and potentially increasing runoff. In some cases, outbuildings such as garages, shops, or barns are also added. In Thurston County, site development is currently held to the standards presented in Chapter 15.05 of the Thurston County Code (County Code) and the 2016 Edition of the Drainage Design and Erosion Control Manual for Thurston County (Manual).

These standards require infiltration or dispersion of stormwater falling on impervious surfaces, with the intent to reduce runoff and erosion and enhance recharge to the subsurface. Additionally, per the County Code and the Manual, any disturbed soil must be amended to enhance infiltration, which will also serve to reduce runoff from the site. Studies indicate a significant increase in the infiltration rate of tilled, compost-amended soils (Brown and Cotton, 2011; Kays, et al, 2015). This is generally consistent with language in ESSB 6091 providing that "an applicant shall manage stormwater runoff on-site to the extent practicable by maximizing infiltration, including using low-impact development techniques, or pursuant to stormwater management requirements adopted by the local permitting authority, if locally adopted requirements are more stringent."

In a typical project, site development activities will be confined to the area immediately surrounding the home and outbuildings, septic drainfield, driveway, and yard. Figure 1 presents an aerial image of the ten parcels in essentially their current condition. Figure 2 presents a historical aerial image from 1996 when only three of the sites were developed or under development and, what appears to be, second-growth forest covering the remaining seven parcels. Based on our analysis of the development pattern of these ten parcels, an average of 75,200 square feet of each lot was cleared for construction and landscaping, or approximately 34% of a 5-acre lot. Within the cleared area, approximately 16,900 square feet of impermeable surfaces (buildings

and driveways) were added, approximately 8% of a 5-acre lot. The remaining cleared area (approximately 58,300 square feet, or 27% of a 5-acre lot, was generally converted to lawn and landscaped areas.

We have presumed that the soils disturbed during the clearing, grading, and development of the site were amended, tilled, and graded in accordance with County Code and Manual requirements. We have also presumed that water falling on impervious surfaces added during development will be infiltrated on site. The change from mature trees to grass lawn results in a reduced amount of canopy capture and evapotranspiration, the magnitude of this reduction is approximately 20% (Zhang, et al, 2004; Sanford and Selnick, 2013).

Additionally, where impervious surfaces, such as the house and driveway, occur no vegetation will grow and the evapotranspiration will be nearly zero. To be conservative, we estimate the evapotranspiration will decline in these areas by 90%.

The pre-development water balance of the property can be calculated using the following factors: precipitation, runoff, evapotranspiration, and recharge. The relationship between these factors can be described as follows:

$$N_P - N_R - N_{ET} = Recharge$$

Where:

 $N_P = Precipitation$ 

 $N_R$ = Runoff

*N<sub>ET</sub>*= Evapotranspiration

In the pre-development condition, the site receives 48 inches of precipitation (Drost, 1999). Evapotranspiration in Thurston County is generally estimated at 18 inches per year (Biever, 2017). Based on the surface geology, recharge is estimated at 18 inches per year (Drost, 1999), so the remaining 12 inches must be considered runoff.

The post-development condition is somewhat more complicated, as the consumptive use calculated earlier must be accounted for and the changes in the nature of the site must be evaluated. Precipitation remains unchanged. Approximately 65% of the 5-acre lot will also remain untouched. Therefore, this analysis only focuses on the portion of the lot that was changed during site development—the 35% of the area that was cleared during construction. Homes, outbuildings, and driveways were added, though compliance with current County stormwater requirements means that the water falling directly on these impermeable surfaces will be re-routed and infiltrated into the subsurface. These impervious surfaces will cover about 8% of a 5-acre lot.

The nature of the ground cover changed from mature trees to a grass lawn where the yard, drainfield, and reserve drainfield are located, other cleared areas were landscaped. This results in a commensurate decrease in evapotranspirative demand discussed earlier. However, in order to keep our analysis conservative, we elected to use three quarters of the earlier-stated decrease (15%). As stated earlier, for the impervious areas, the evapotranspiration rate will be reduced by approximately 90%. The amended soils in this area will have an enhanced infiltration capacity and will more readily accept rainfall, and County regulations require infiltration and dispersion of runoff, significantly reducing runoff from this portion of the property. As a conservative value, we reduced runoff by a quarter, to a value of nine inches per year.

Septic return flow will offset some of the water use on the property. Typically, 90% of the indoor use is considered to be returned to the drainfield (Culhane and Nazy, 2015, and Washington State Department of Ecology, 2018). However, we applied an evapotranspirative loss factor (ranging from 10% in May up to 30% in July and August) to the septic effluent return flow, as laterals may be within reach of plant and turf roots, resulting in the uptake of some of the effluent during hotter months. Finally, the water used outdoors is considered to be a largely consumptive use, with only 20% infiltrated into the subsurface (Culhane and Nazy, 2015).

With these factors, we are able to calculate a post-development water budget via the following relationship:

$$N_P - N_R - N_{ET} - N_{WW} + N_{OR} + N_{SR} = Recharge$$

Where:

 $N_P = Precipitation$ 

 $N_R$ = Runoff

N<sub>ET</sub>= Evapotranspiration

Nww= Well Withdrawal

*N*<sub>OR</sub>= Outdoor Use Return Flow

N<sub>SR</sub>= Septic Return Flow

The results of this calculation are presented in Table 1.

Table 1: Pre- and post-development annual average water balance

Pre-development		Post Development (High Water Use, using Ecology's ESSB 6091 guidance)		Post Development (Moderate Water Use)		
	in/yr	gal/day	in/yr	gal/day	in/yr	gal/day
Precipitation	48	6,164	48	6,164	48	6,164
Runoff	-12	-1541	-9	-1156	-9	-1156
Evapotranspiration <sup>(1)</sup>	-18	-2,312	-11.6	-1486	-11.6	-1486
Well Withdrawal	0	0	-11.7	-597	-4.5	-229
Septic Return	0	0	2.6	135	2.9	149
Outdoor Return	0	0	1.7	89	0.3	13
Recharge	18	2,312	20.0	2,589	26.1	3353
		_	Total Change	277		1041

<sup>&</sup>lt;sup>1</sup> Reduction prorated for combination of pervious and impervious surfaces

In the post-development condition, groundwater use from the planned well is partially offset by the infiltration of septic return flow and the partial infiltration of water used outside the home. The decrease in evapotranspiration of the developed area of the property, when coupled with the decreased runoff and increased infiltration capacity of the amended soils, results in an increase in the amount of water recharging the subsurface. Our analysis suggests that the resulting water balance of a project like this, under either water use scenario, more than completely

offsets the consumptive use from the proposed well on the property, providing an increased amount of groundwater recharge under the post-development condition.

#### Seasonal Consideration

Under Ecology's ESSB 6091 water use estimates, the annual water balance indicates a 277 gallon per day increase per lot in average groundwater recharge. Using the lower water use estimates, as published by Culhane and Nazy (2015) and Golder (2013), the annual water balance indicates a 1,041 gallon per day increase per lot in average recharge due to the development.

However, these increases in groundwater recharge do not occur evenly over the year. The increase in recharge due to the reduction in runoff will occur mainly in the wet season. The reduction in evapotranspiration will occur mostly in the dry season. Water use, and consequently well production, will be higher in the dry season. Return from outdoor water use will occur mainly in the dry season. Returns from indoor use will occur year-round, largely unaffected by the seasonal changes in outdoor use.

If we consider the dry season to occur from May and October, assign the changes in water balance between wet and dry seasons accordingly, and presume that all the changes in recharge occur during this season, we can develop an approximate change in recharge for the dry season as shown on Table 2.

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Table 7. Drv	' season	cnande	ın	recharde
Table 2: Dry	3003011	change		rconargo

	High Water Use	Moderate Water Use
	gal/day	gal/day
Precipitation	0	0
Runoff reduction	0	0
Evapotranspiration reduction	826	826
Well Withdrawal <sup>1</sup>	-1037	-292
Outdoor Return	89	13
Septic Return <sup>2</sup>	135	149
Total Change	13	695

<sup>&</sup>lt;sup>1</sup> Average well production from May through October

The effects of both the well production and the recharge will be attenuated relative to aquifer discharges to surface water due to both vertical and horizontal distance and the fact that the aquifers have substantial storage. Timing of recharge entering the aquifer will be attenuated by the sediments between the land surface and the aquifer. However, as indicated by Table 2, the increase in recharge even during the dry season should be larger than the consumptive use. Because of attenuation effects, the system should act largely in a steady-state manner. And certainly, any transient analysis on a time period shorter than wet and dry seasons is not warranted.

#### Conclusion

Based on our analysis of the historical development of ten five-acre lots, we have concluded that the consumptive water use and groundwater withdrawals of such a typical development are more than completely offset by the changes in evapotranspiration, reduction in runoff, and

<sup>&</sup>lt;sup>2</sup> Average septic return flow from May through October

the septic return flows associated with the development. The year-round net annual water balance in the post-development condition is positive and results in additional infiltration to the subsurface.

The statements, conclusions, and recommendations provided in this report are to be exclusively used within the context of this document. They are based upon generally accepted environmental and hydrogeologic practices and are the result of analysis by Robinson Noble, Inc. staff. This report, and any attachments to it, is for the exclusive use of Bill Clarke and Washington REALTORS®. Unless specifically stated in the document, no warranty, expressed or implied, is made.

#### **Attachments**

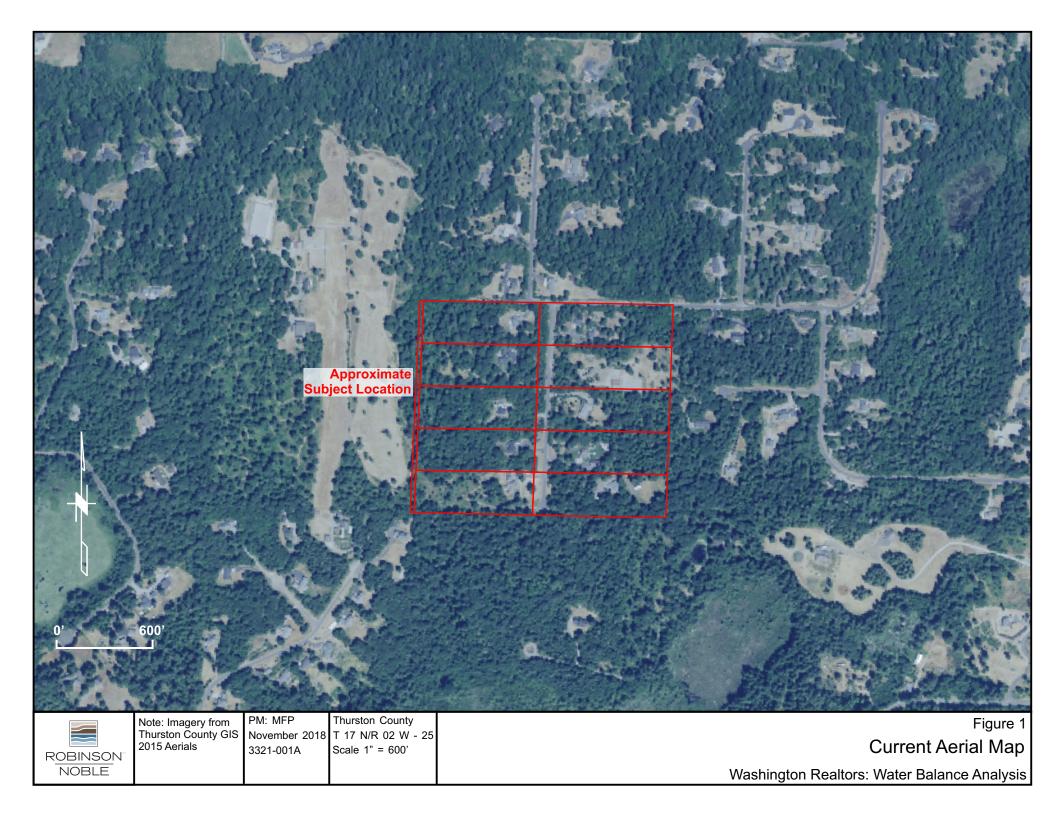
Figure 1 – Current Aerial Map Figure 2 – Historical Aerial Map

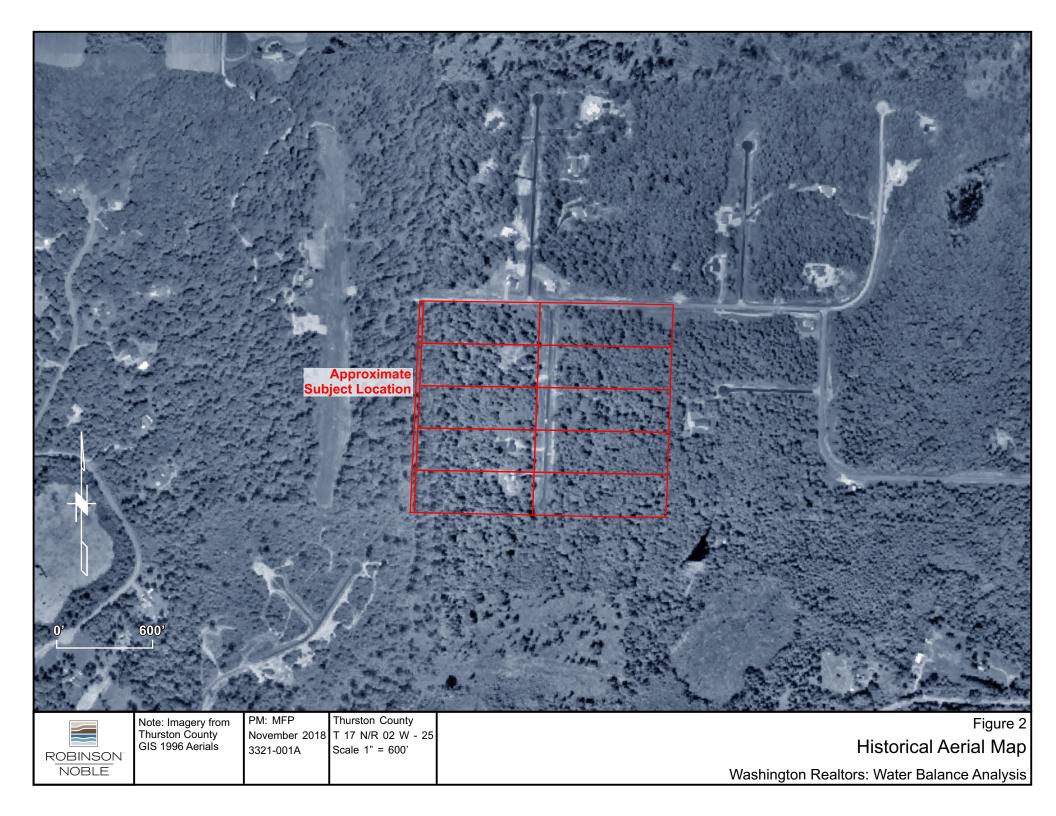
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### ATTACHMENTS







#### JULIANN AND PAT SULLIVAN HYDROGEOLOGIC ASSESSMENT 15712 28<sup>TH</sup> AVENUE NORTHWEST PIERCE COUNTY PARCEL 0222171053

FEBRUARY, 2017

by

Michael F. Piechowski, LHG Principal Hydrogeologist



Pat and Juli Sullivan Pierce County Parcel 0222171053 15712 28<sup>th</sup> Avenue Northwest Hydrogeologic Assessment February 17, 2017

#### Introduction and Scope

This assessment has been prepared for Pat and Juli Sullivan to meet the requirements stated in Pierce County Policy Number DW2016-02, which requires a hydrogeologic assessment to determine if the proposed exempt well for a building project "impacts or impairs a senior water rights holder, and impacts or impairs established instream flows and closures as identified by the State." This policy is applicable in certain areas of Pierce County including portions of the Kitsap Watershed (WRIA 15). The site is located within the Crescent Valley drainage, an area that is seasonally closed to surface water appropriations, so it is included in this policy.

The site is located on the western side of 28<sup>th</sup> Avenue NW, north of Gig Harbor, Washington in unincorporated Pierce County. This area is within the Kitsap Watershed. The street address is 15712 28<sup>th</sup> Ave. NW, the Pierce County tax parcel number is 0222171053. The surrounding properties are generally developed with single-family residences on large lots. Figure 1 presents a site map, including the boundaries of the parcel and the location of wells evaluated for this assessment.

We understand that the proposed project involves the construction of a three-bedroom single-family residence to be served by an individual well and septic system. We reviewed a provided plat plan, wetland delineation report, and septic design for the proposed project. The proposed well is located on the parcel such that the 100-foot sanitary control radius does not overlap the planned septic drainfield or reserve area. The sanitary control radius does extend onto the neighboring property to the east, but a signed affidavit from that landowner has been filed with the County, so no well variance is required.

#### Site Setting and Topography

The site is located in the in the Crescent Valley area, on an upland above Crescent Lake, the source of Crescent Creek. The upland has an undulatory surface that was sculpted by the most recent continental glaciation. The features in this area generally trend from the north-northeast to the south-southwest, with lineations corresponding to the presumed direction of glacial motion. The property has a rectangular shape, 325 feet in a north-south direction, and 650 feet in an east-west direction. According to the USGS topographic quadrangle of the area, the site has an elevation of approximately 355 feet along the eastern margin, then with a gentle drop to 345 feet approximately 1/3 to the way to the western margin, then the elevation rises to 370 feet at the western margin.

We recently visited the site. No standing water was observed on the eastern portion of property, nor was any standing water observed in septic test pits on the property. The site is covered with mature trees, a mix of coniferous (Douglas fir, western red cedar, and hemlock) and

deciduous (red alder and big-leaf maple). The understory was fairly clear, though some salal and blackberry were observed. At the time of our site visit, the home site and a portion of the proposed drainfield were partially cleared and the home location staked out. It may be necessary to remove additional trees within the footprint of the home, driveway, and septic drainfield to develop the property as planned.

General drainage patterns in the area follow the local topography. The upland containing the property generally slopes to the southeast, and the site is situated across a slight valley that drains to the south, so surficial drainage generally flows to the south towards Crescent Lake and Crescent Creek.

#### Surface Water

The site is located in Water Resource Inventory Area 15, specifically within the Crescent Creek basin. The local surface water drainage is towards the south. The nearest significant surface water is Crescent Lake, approximately 3,200 feet to the southeast. The nearest significant surface stream is Crescent Creek which is approximately 4,500 feet to the south of the property, though the USGS quadrangle shows a small tributary creek to Crescent Lake beginning approximately 2,000 feet directly south of the property. During periods of significant runoff, it is likely this small creek has an ephemeral appearance on the property. Crescent Creek flows out of Crescent Lake toward the south and discharges into Puget Sound at Gig Harbor.

#### Soils and Vegetation

The five-acre site is mostly covered with the Harstine gravelly ashy sandy loam with 6 to 15 percent slopes, a small portion of the site near the western boundary has steeper slopes (US Department of Agriculture, Soil Conservation Service). The Harstine loam is a moderately well-drained soil. It forms on the top of sandy glacial drift and generally contains volcanic ash. This soil is considered to be a part of Hydrologic Group C and is not considered a hydric soil. Our observations of the material on site are consistent with the soil survey data; we observed a tan to brown gravelly, sandy silty loam with occasional larger cobbles. Soils information is presented in Appendix A.

#### Site Geology

Site geology was determined by reviewing published geologic maps of the region. Booth and Troost (2005) map the site and surrounding area as the Vashon till, which is a highly-compacted mixture of sand, gravel, silt and clay that was deposited beneath and overridden by the latest continental glaciation. Typically, till has a relatively low permeability, though it may vary locally based on the composition and the degree of compaction. Review of nearby water well reports suggests that the till is generally over 50 feet thick in the area.

#### Conceptual Hydrogeologic Understanding

To better understand the relationships between aquifers, confining units, groundwater, and surface water features, we developed a conceptual model of the study area. The site is located on the eastern margin of the glaciated upland that forms the Kitsap Peninsula. Puget Sound borders the peninsula to the east, south, and southwest, and glaciated upland plains extend to the north and west towards Sinclair Inlet and Hood Canal, respectively.

The top of the upland is capped with the Vashon till, which forms a relatively low-permeability confining unit. A thin veneer of Vashon outwash deposits may be locally present over the top of the till, but in the vicinity of the site, the till is present at the surface. Geologic maps and well

logs suggest the thickness of the till is at least 90 feet in the vicinity of the site. The till surface is gently rolling; there are lineations that trend north-northeast to the south-southwest, corresponding to the presumed direction of glacial motion.

The Vashon advance outwash (Qva) sand is present beneath the till. Pre-Vashon deposits are not specifically named in Welch (2014) or Booth and Troost (2005), but rather are described texturally. For the purposes of this study, the descriptions in Welch will be used, with no discussion of deposits deeper than the sea level Aquifer (QA1), as the deepest wells reviewed do not even reach sea level. The unconsolidated sediments in this portion of Pierce County exceed 1,000 feet thick.

The first principal aquifer in the region is a confined aquifer formed in the Vashon advance outwash sand. The Vashon advance outwash sand is well-sorted sand with occasional gravel; it may also contain silty zones. While it may be unconfined, a review of well logs completed within the advance sand suggest that it is fully saturated in this area, and therefore, is confined in this area. Its thickness ranges from 20 to 240 feet, averaging 85 feet in the Kitsap Peninsula area (Welch, 2014).

Well logs from the area around the property indicate the Vashon advance outwash generally has two zones of sand and gravel separated by silty zone (clay is sometimes described as well, though the presence of true clay in Vashon outwash sediments should be limited). It appears most well require drilling into the deeper zone to find an adequate supply.

A deeper aquifer also exists in the area. Welch identifies this deeper aquifer the sea level aquifer (QA1) (Welch, 2014). Typically, it is separated from the advance sands by a thick clay or silt. The aquifer material is typically described as water-bearing sand, occasionally having some gravel.

The Vashon advance outwash is exposed at lower elevations where valleys have been eroded through the till. The valley containing Crescent Lake and Crescent Creek have significant outcrops of the Vashon advance outwash. Spring discharge and seepage is common along the walls of these valleys. The valleys floors are covered with the Vashon recessional outwash, which is a coarser sand and gravel deposited by glacial meltwater as the glaciers retreated.

As the aquifer deposits within the Vashon advance outwash and the QA1 have a significant regional extent in this watershed, recharge to the aquifers results from the infiltration of precipitation throughout the region, and gradients tend to be regionally influenced. The general flow direction within the Qva aquifer is towards the south in the vicinity of the site. The flow in the QA1 aquifer is southeasterly toward Colvos Passage (Welch, 2014).

Though some water undoubtedly runs off the upland via surface drainage, a significant portion infiltrates where slopes are not extreme or where it is captured in depressions. A portion of this water discharges as spring flow along the valley walls, but some fraction infiltrates deeper and is the fundamental mechanism for aquifer recharge. Based on the observed head relationship between the noted aquifer zones, some portion of the water in the shallower zone infiltrates and provides recharge to the deeper aquifer systems evaluated.

The discharge points for the shallow Qva aquifer include springs and seepage along the valley containing Crescent Lake and Crescent Creek to the south of the property and to Colvos Passage coastline to the east. The site straddles a small valley within the upland, so surficial runoff and shallow groundwater are presumed to also flow in a southerly direction towards Crescent Lake and Crescent Creek. Given the relative elevations, there isn't a local discharge point for

the QA1 aquifer system. Based on groundwater flow information presented in Welch and our regional understanding of groundwater flow, the QA1aquifer generally flows in east-southeast-erly and discharges in Colvos Passage (Welch, 2014).

#### Well Analysis

As described above, there are several aquifers in the region that supply water to domestic wells. We reviewed well logs in the vicinity of the proposed project, geocoding the well locations to the degree possible given the information on the water well reports. We also evaluated the stratigraphic logs and well completion information to determine depths and type of aquifer present near this location.

Well depths in the vicinity range from 53 to 218 feet deep. Of the 39 wells evaluated for this study, 14 are located within 1,500 feet of the proposed well. These were analyzed further, and the logs of these wells are included in Appendix B. Of these, 3 are completed at approximately 55 feet deep and 3 are completed at around 100 feet; these are all completed in the Qva aquifer. The remaining 6 are completed in the deep QA1aquifer, found at 170 feet. The depths to water are typically 20 to 50 in the shallow aquifer and around 90 feet in the deeper system. This increasing depth to water (decreasing head with increasing depth) indicates that this area is an aquifer recharge area.

We calculated aquifer characteristics using the pumping test information recorded on the logs following the methods described in Welch (2014). When the water well report included information from a pump or bailer test, we calculated aquifer transmissivity via the modified Theis formula presented in Ferris (1962). In cases where the well was tested with an air test, we used the equation developed by Bear (1979) to calculate a hydraulic conductivity for the aquifer material, then calculated aquifer transmissivity by multiplying the calculated hydraulic conductivity by the thickness of the water-bearing deposit. Aquifer parameters were tabulated, then averaged. At this location, it is apparent that two separate aquifer zones are present, we so we calculated average values for each aquifer.

Table 1: Wells within 1,500 feet

Well ID	Tag	Radial Dis- tance (ft)	Depth (ft)	Depth to Water (ft)	Aquifer Zone	Theis Transmis- sivity (gpd/ft)	Bear Trans- missivity (gpd/ft <b>)</b>
358079	ABA-064	250	102	65	Qva	679	
55131	ABP-815	390	178	107	QA1	1490	
55134	ABP-828	460	119	72	Qva	5580	
509961	BAT-439	540	148	83	QA1	1042	
1568113	BIY-098	680	98	40	Qva	1931	
1568407	BJN-278	820	151	74	QA1	1051	
511663	APR-640	890	160	108	QA1	2297	
43804		920	90	45	Qva	2988	
47822		1030	86	46	Qva	863	
52826		1060	53	20	Qva	2097	
583877	ABG-626	1065	53	22	Qva		2513
48908		1120	161	90	QA1	3621	

Well ID	Tag	Radial Dis- tance (ft)	Depth (ft)	Depth to Water (ft)	Aquifer Zone	Theis Transmis- sivity (gpd/ft)	Bear Trans- missivity (gpd/ft <b>)</b>
360212	AGE-533	1480	218	92.5	QA1	568	
48966		1490	63	25	Qva	1117	

The shallow aquifer transmissivity values average approximately 2,100 gallons per day per foot of aquifer width (gpd/ft), though wells in the shallower portion of the aquifer show a slightly smaller transmissivity at about 1,900 gpd/ft and those in the deeper portion a slightly higher value averaging around 2,400 gpd/ft. The deep aquifer has an average transmissivity of about 1,700 gpd/ft.

Using these values, we evaluated the potential for the new well to impair existing wells by calculating the interference drawdown for each of the neighboring wells as a result of the proposed new well. The Theis equation (Theis, 1935) for calculating steady-state drawdown at a radial distance was used, though due to the scarcity of data, we relied upon an assumed storage coefficient of 0.0001, as used by Welch (2014), which, though conservative, is an appropriate value for confined sand and gravel aquifer materials.

We selected a pumping rate based on information tabulated in Welch (2014). The evaluation of 27 years of water use in the Kitsap Peninsula indicates that indoor use averages 66 gallons per day (gpd) per person. Outdoor use ranges from 0 to a maximum of 97 gpd per person depending on the month, and we calculated an average of 61 gpd for the 6-month growing season (May through October). The US Census calculated an average of 2.65 persons per household in Pierce County, so the per-person water use numbers were multiplied by this amount. These calculations indicate an indoor water use, growing-season outdoor water use, and total water use of 175, 162, and 337 gpd, respectively. These values are approximately double those presented in Culhane and Nazy (2015) and Golder (2013), but were used to complete a conservative analysis. Culhane and Nazy (2015) state that indoor use is only 10% consumptive, the remaining 90% is returned via septic infiltration, and that residential outdoor use is considered to be 80% consumptive, with 20% returned via infiltration. Other sources, such as Savoca (2010) suggest outdoor return flow can be as high as 40%. To stay conservative in our approach, we used the 80% consumptive value.

A rate of 337 gpd was selected to calculate the potential for impact during the highest-use period. Under steady-state conditions, this equates to slightly more than 0.2 gallons per minute (gpm). Using the equations presented in Theis (1935), we calculated the predicted drawdowns at each of the wells within 1,000 feet of the proposed well after 184 days (May – October) of continuous pumping, representing the conditions at the end of the summer season.

Table 2: Predicted drawdown after 100 days of pumping

Well ID	Tag	Radial Distance (ft.)	Aquifer	Predicted Drawdown (ft.)
358079	ABA-064	250	Qva	0.11
55131	ABP-815	390	QA1	0.14
55134	ABP-828	460	Qva	0.10
509961	BAT-439	540	QA1	0.13
1568113	BIY-098	680	Qva	0.09

Well ID	Tag	Radial Distance (ft.)	Aquifer	Predicted Drawdown (ft.)
1568407	BJN-278	820	QA1	0.12
511663	APR-640	890	QA1	0.11
43804		920	Qva	0.08
47822		1030	Qva	0.08
52826		1060	Qva	0.10
583877	ABG-626	1065	Qva	0.10
48908		1120	QA1	0.11
360212	AGE-533	1480	QA1	0.10
48966		1490	Qva	0.09

The nearest well in the upper portion of the Qva aquifer is 1,060 feet away. The conservative 184-day prediction results in 0.10 feet of drawdown at this radial distance, which does not represent an impairment in a well with over 30 feet of available drawdown. The nearest well in the deeper portion of the Qva aquifer is 250 feet away. A similar calculation predicts a drawdown of 0.11 feet. Similarly, this does not represent an impairment, as wells completed in the deeper portion of the Qva typically have over 50 feet of drawdown available. The nearest well in the deep QA1 aquifer is 390 feet away. The predicted drawdown at this location is 0.14 feet, which does not represent an impairment in a well that has over 70 feet of available drawdown. These small values of predicted drawdown approach the accuracy limit of the Theis approach as applied to the available dataset.

#### Water Balance Analysis

To assess impacts to Crescent Lake and Creek and other surface waters in the area, we completed a water balance evaluation of the property and proposed development on an annualized basis. This analysis concentrated on the changes as a result of the proposed project from the pre-development conditions.

We used information presented in Garling and Molenaar (1965) and Welch (2014) to determine the rainfall and infiltration rate of the site. Based on those publications, the site and surrounding area receive 48 inches of rainfall, with 14.5 inches of that resulting in recharge to the aquifers beneath the site.

As we understand the project, there will be a home and driveway constructed on the eastern margin of the site, forming impermeable surfaces and potentially increasing runoff. In Pierce County, site development is held to the standards presented in Title 17A of the Pierce County Code and the Pierce County Stormwater Management and Site Development Manual, these require infiltration or dispersion of stormwater falling on impervious surfaces, with the intent to reduce runoff and erosion and enhance recharge to the subsurface. Additionally, per the County Code and Manual, any disturbed soil must be amended to enhance infiltration, which will also serve to reduce runoff from the site. Studies indicate a significant increase in the infiltration rate of tilled, compost-amended soils (Brown and Cotton, 2011; Kays, et al, 2015).

As we understand the project, site development activities will be confined to the area immediately surrounding the proposed home, septic drainfield, driveway, and yard. As planned, there will be several fir and alder trees removed, but incidental clearing will be limited to the eastern portion of the property. For the purposes of this assessment, we have calculated that no clearing or grading will take place further west than the edge of the mapped wetland buffer, yielding

a project area of approximately 30,000 square feet. We have presumed that the soils disturbed during the clearing, grading, and development of the site will be amended, tilled, and graded in accordance with County Code and Manual requirements. We have also presumed that all water falling on impervious surfaces added during development will be infiltrated on site. The change from mature trees to a grass lawn in this area of the property will result in a reduced amount of canopy capture and evapotranspiration, the magnitude of this reduction is approximately 20% (Zhang, et al, 2004; Sanford and Selnick, 2013).

Additionally, where impervious surfaces, such as the house and driveway, occur no vegetation will grow and the evapotranspiration will be nearly zero. To be conservative, we estimate the evapotranspiration will decline in these areas by 90%.

The pre-development water balance of the property can be calculated using the following factors: precipitation, runoff, evapotranspiration, and recharge. The relationship between these factors can be described as follows:

$$N_P - N_R - N_{ET} = Recharge$$

Where:

 $N_P = Precipitation$ 

 $N_R$ = Runoff

N<sub>ET</sub>= Evapotranspiration

In the pre-development condition, the site receives 48 inches of precipitation Garling and Molenaar, 1965). Evapotranspiration in Pierce County is generally estimated at 22 inches per year (Savoca, 2010). Based on the surface geology, recharge is estimated at 15 inches per year (Welch, 2014; Savoca, 2010), so the remaining 11 inches must be considered runoff.

The post-development condition is somewhat more complicated, as the consumptive use calculated earlier must be accounted for and the changes in the nature of the site must be evaluated. Precipitation remains unchanged. Approximately 86% of the area of the site will also remain untouched. The remaining 14% of the site will be cleared, graded, and changed as discussed earlier. A home and driveway will be added, though compliance with County stormwater requirements means that the water falling directly on these impermeable surfaces will be re-routed and infiltrated into the subsurface. These impervious surfaces will cover about 2% of the site.

The nature of the groundcover will change from mature trees to a grass lawn in the area where the yard, drainfield, and reserve drainfield will be located. This will result in a commensurate decrease in evapotranspirative demand discussed earlier. However, in order to keep our analysis conservative, we elected to use three quarters of the earlier-stated decrease (15%). As stated earlier, for the impervious areas, the evapotranspiration rate will be reduced by approximately 90%. The amended soils in this area will have an enhanced infiltration capacity and will more readily accept rainfall, and County regulations require infiltration and dispersion of runoff, significantly reducing runoff from this portion of the property. As a conservative value, we reduced runoff by a half, to a value of 5.5 inches per year.

Septic return flow will offset some of the water use on the property. Typically, 90% of the indoor use is considered to be returned to the drainfield (Culhand and Nazy, 2015). However, we

applied an evapotranspirative loss factor (ranging from 10% in May up to 30% in July and August) to the septic effluent return flow, as laterals may be within reach of plant and turf roots, resulting in the uptake of some of the effluent during hotter months. Finally, the water used outdoors is considered to be a largely consumptive use, with only 20% infiltrated into the subsurface (Culhane and Nazy, 2015).

With these factors, we are able to calculate a post-development water budget via the following relationship:

$$N_P - N_R - N_{ET} - N_{WW} + N_{OR} + N_{SR} = Recharge$$

Where:

 $N_P = Precipitation$ 

 $N_R$ = Runoff

*N<sub>ET</sub>*= Evapotranspiration

Nww= Well Withdrawal

*N*<sub>OR</sub>= Outdoor Use Return Flow

N<sub>SR</sub>= Septic Return Flow

The results of this calculation are presented in Table 3.

Table 3: Pre- and post-development annual water balance

Pre-development				
	in/yr	gal/day		
Precipitation	48	2459		
Runoff	-11	-564		
Evapotranspiration	-22	-1127		
Well Withdrawal	0	0		
Septic Return	0	0		
Outdoor Return	0	0		
Recharge	15	768		

Post-development					
	in/yr	gal/day			
Precipitation	48	2459			
Runoff (-50%)	-5.5	-282			
Evapotranspiration (-74.2%) <sup>1</sup>	-16.3	-836			
Well Withdrawal	-4.7	-243			
Outdoor Return (20%)	0.3	14			
Septic Return (63% to 90%) <sup>2</sup>	2.8	142			
Recharge	24.5	1254			
Total Change		485			

<sup>&</sup>lt;sup>1</sup> Reduction prorated for combination of pervious and impervious surfaces

In the post-development condition, groundwater use from the planned well is partially offset by the infiltration of septic return flow and the partial infiltration of water used outside the home. The decrease in evapotranspiration of the developed area of the property, when coupled with the decreased runoff and increased infiltration capacity of the amended soils, will result in an increase to the amount of water recharging the subsurface. The resulting water balance of this project entirely offsets the consumptive use from the proposed well on the property and provides an increase in recharge as a result of the post-development condition.

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<sup>&</sup>lt;sup>2</sup> 90% return flow in wet season ranging downward to 63% in dry season due to ET uptake above drain field

#### Seasonal Consideration

The annual water balance indicates an increase in average recharge at the property of 485 gallons per day due to the development. However, this increase in recharge will not occur evenly over the year. The increase in recharge due to the reduction in runoff will occur mainly in the wet season. The reduction in evapotranspiration will occur mostly in the dry season. Water use, and consequently well production, will be higher in the dry season. Return from outdoor water use will occur mainly in the dry season. And return from indoor use will occur year-round, but will be higher in the wet season due to possible uptake by plants above the drain field.

If we consider the dry season to occur from May and October, assign the changes in water balance between wet and dry seasons accordingly, and presume that all the changes in recharge occur during this season, we can develop an approximate change in recharge for the dry season as shown on Table 4.

T 1 1 1	Drv season		
1 2012 /1:	I Irv coacon	changa ir	rocharaa
101115 4	171 V 5EG5UII	CHAILUE II	i i ettilattie

	9
	gal/day
Precipitation	0
Runoff reduction	0
Evapotranspiration reduction	291
Well Withdrawal <sup>1</sup>	-310
Outdoor Return	14
Septic Return <sup>2</sup>	126
Total Change	121

<sup>&</sup>lt;sup>1</sup> Average well production from May through October

The effects of both the well production and the recharge will be attenuated relative to aquifer discharges to surface water due to both vertical and horizontal distance and the fact that the aquifers have substantial storage. Timing of recharge entering the aquifer will be attenuated by the approximately 50 feet of sediments between the surface and the upper aquifer. However, as indicated by Table 4, the increase in recharge even during the dry season should be larger than the consumptive use.

In the case of the well, if it is placed in the Qva aquifer, it will be roughly 4,000 to 5,000 feet from the nearest downgradient aquifer discharge point in the Crescent Valley Creek. If it is placed in the lower portion of the QA1 aquifer, it will be 6,000 to 7,000 feet from the likely aquifer discharge points at Colvos Passage. Considering that the highest daily average production rate will be approximately 0.3 gpm, resulting in drawdown in the aquifer outside the wellbore of less than one foot, the change in gradient driving the change in aquifer discharge will be extremely small. Further, this change in gradient should be offset by the increase in recharge. In the case of a well in the Qva aquifer, the production and increase in recharge occur in the same aquifer, negating effects to the nearby creek and lake, which receives discharge from that aquifer. In the case of the well being completed in the QA1 aquifer, the increase in recharge to the shallow aquifer will increase flows to Crescent Creek, while the pumping impact from the well will mostly occur as a smaller discharge directly to Puget Sound. Pumping from the QA1 aquifer may slightly increase leakage downward out the Qva, causing an extremely small decrease in discharge to Crescent Lake and Creek from the Qva, but this will be greatly offset by the increase in recharge to the Qva.

<sup>&</sup>lt;sup>2</sup> Average septic return flow from May through October

Because of attenuation effects, the system should act largely in a steady-state manner. And certainly, any transient analysis on a time period shorter than wet and dry seasons is not warranted.

#### Recommendations

Consider drilling the proposed well to at least 100 feet deep in order to complete the well in the deeper portion of the Qva aquifer. The shallower wells have a higher susceptibility to impacts due to surficial contamination and are more likely to experience seasonal deficiencies. Additionally, the wells completed in the deeper portion of the Qva and the Qa1 aquifer have twice the available drawdown, so they should prove to be a more reliable water source over the long term.

#### Conclusion

Based on our analysis of the information provided, the well proposed to supply this project will not impact or impair a senior water rights holder, and will not impact or impair established instream flows and closures as identified by the State. As the net annual water balance in the post-development condition is positive and results in additional infiltration, no mitigation is required.

The statements, conclusions, and recommendations provided in this report are to be exclusively used within the context of this document. They are based upon generally accepted environmental and hydrogeologic practices and are the result of analysis by Robinson Noble, Inc. staff. This report, and any attachments to it, is for the exclusive use of Pat and Juli Sullivan. Unless specifically stated in the document, no warranty, expressed or implied, is made.

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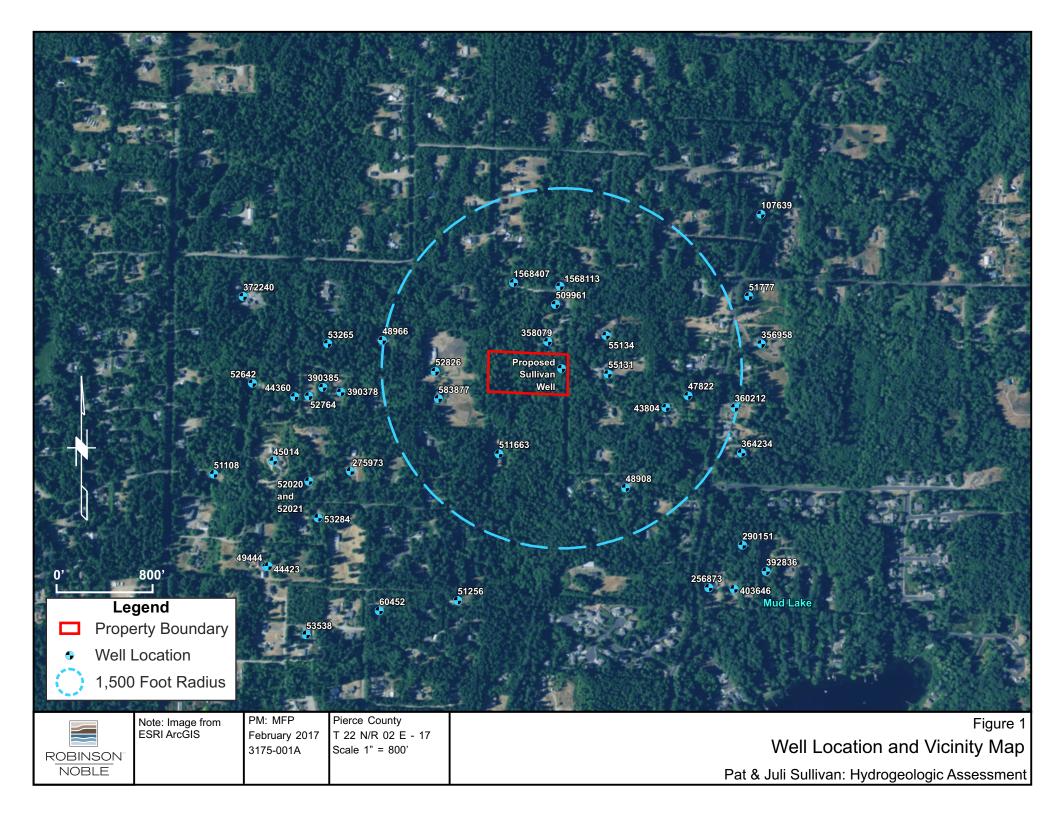
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#### **Attachments**

Appendix A Figure 1 – Well Location and Vicinity Map Appendix B Well Logs Appendix C Soil Logs







The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

# WATER WELL REPORT STATE OF WASHINGTON

Arpho Application No

Permit No. . . .

(1) OWNER: Name A. L. Hart (Tallman)	Address 15616 Crescent Valley D	r. N.	W. Gig
(2) LOCATION OF WELL: County Pierce	NE ¼ NE ¼ Sec. 17 T2	2n., R	ZEwm.
Bearing and distance from section or subdivision corner	<u> </u>		
(3) PROPOSED USE: Domestic 🕱 Industrial 🗆 Municipal 🗀	(10) WELL LOG:		
• Irrigation [] Test Well [] Other	Formation: Describe by color, character, size of material show thickness of aquifers and the kind and nature of t stratum penetrated, with at least one entry for each ch	ana siru he materi ianae of	cture, and al in each formation.
(4) TYPE OF WORK: Owner's number of well (if more than one)	MATERIAL	FROM	TO
New well  Method: Dug  Bored	Topsoil	0	2
Despensed ☐ Cable ☐ Driven ☐ Reconditioned ☐ Rotary ☐ Jetted ☐	Sand & gravel brown hardpan	_2	37
Reconditioned B	Blue sand & gravel hardpan	<del>_37</del>	53
(5) DIMENSIONS: Diameter of well 6 inches.  Drilled 90 ft Depth of completed well 90 ft.	Sand & gravel some water	53	63
	Gray hardpan some seepage	_ <del>63</del>	90 -
(6) CONSTRUCTION DETAILS:	Sand & gravel water bearing		7
Casing installed: 6 Diam. from to 85 nt.			
Threaded   " Diam. from		<del></del>	
Welded 12 Dlam. from It. to		-	<del>-</del>
Perforations: Yes □ No □X		<del></del>	<del> </del>
Type of perforator used		· <u>-</u>	<del></del>
perforations from ft. to ft.			
perforations from		ļ	<del></del>
perforations from		<del></del> -	
Screens: Yes No D Labrage	DECENT	FN	<del></del>
Manufacturer's Name Johnson  Type Stainless Steel Model No.		<del>LD</del>	<del>-</del> 1
Diam O Slot size 1.5 from 0.5 ft. to 1 ft.			
Diam. Slot size from ft. to ft.	JUN 12 19/5		
Gravel packed: Yes   No [k Size of gravel:	DEPARTMENT OF FOR		2
Gravel placed from ft. to ft.	SOUTHWEST RECOVER	<del>1037 -</del>	(,,
Surface seal: Yes [] No [] To what depth? ft.		<del>V-∴ICE</del>	<del> </del>
Material used in seal			
Did any strata contain unusable water? Yes [ No [ Type of water? Depth of strata			7
Method of sealing strata off		ļ	<u> </u>
		+	<del> </del> /
(7) PUMP: Manufacturer's Name		<del>  -</del> -	+
		1	
(8) WATER LEVELS: Land-surface elevation above mean sea level. 340 static level 45 static leve			
Artesian pressureibs. per square inch Date		<del></del> _	<del></del>
Artesian water is controlled by(Cap, valve, etc.)		-	
The second secon	10.22	1 <mark>0-16</mark>	
(9) WELL IESIS: lowered below static level	Work started. 1 M. 15.	TATTO	
Was a pump test made? Yes No If yes, by whom?  Yield: gal./min. with ft. drawdown after hr	MELL DRILLERS STATEMENT.		
n 0 0 0	I THIS WELL WAS ULLINED TOTAL WITH THE CONTRACTOR	and thi	s report is
о о о	-   200 10 100		
Recovery data (time taken as zero when pump turned off) (water lever measured from well top to water level)  Time Water Level Time Water Level Time Water Level	NAME HAD OD PUMD CC LL	Co (Type or	Inc
	Address 7825 46th Ave. N.W.		
Date of test 10-16-62	[Signed Bynl Justin B	y:M.	Butler
Bailer test 40 gal/min. with 25 ft. drawdown after hr			
A starten flow g.p.m. Date	U4/O	11	, 197 <u>.1</u> .
Temperature of water			, ,

## WATER WELL REPORT

Application No

STATE OF WASHINGTON Permit

Permit No.	 	-	 _
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WELL LOG:  ation: Describe by color, character, size of mater thickness of aquifers and the kind and nature of im penetrated, with at least one entry for each MATERIAL  COWN top Soil cay Hard pan andy brown hard pan rown sand, some seepage rown sandy clay ray sandy hard pan ray hard pan with clay ray hard pan with clay ray sand and gravel, water hearing ard packed sand & gravel ray sand & gravel, water ard packed sand & gravel ray sand & gravel	22 <sub>N. R.</sub> rail and struing the materichange of 26 31 38 43 60 68 74 77 82 86	cture, and all in each formation.  TO  3  26  31  38  43  60  68  74  77  82  86
ation: Describe by color, character, size of mater thickness of aquifers and the kind and nature of im penetrated, with at least one entry for each MATERIAL  COWN top soil cay Hard pan andy brown hard pan rown sand, some seepage rown sandy clay ray sandy hard pan ray Hard pan ray hard pan with clay ray sand and gravel, water bearing ard packed sand & gravel ray sand & gravel, water	74 77 82	70 3 26 31 38 43 60 68 74 77 82 86
ation: Describe by color, character, size of mater thickness of aquifers and the kind and nature of im penetrated, with at least one entry for each MATERIAL  COWN top soil cay Hard pan andy brown hard pan rown sand, some seepage rown sandy clay ray sandy hard pan ray Hard pan ray hard pan with clay ray sand and gravel, water bearing ard packed sand & gravel ray sand & gravel, water	74 77 82	70 3 26 31 38 43 60 68 74 77 82 86
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ie to the best of my knowledge and belief	1,	
AME HARBOP PUMP & DRILLING	E CO	INC.
idress 11302 Burnham Dr. 174	Gig Ha	arbor,
1.	-	,·-
amount / // / MIC LOCAL CONCE	By: ]	F. Kil
(Well Driller)		
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007 03 04FF		ے 19. ہے۔
7	ork started 1-24 19 30 Completed  /ELL DRILLER'S STATEMENT:  This well was drilled under my jurisdiction to the best of my knowledge and belief  AME HARBOP PUMP & DRILLING (Person, firm, or corporation)  ddress 11302 Burnham Dr. 177	This well was drilled under my jurisdiction and this ue to the best of my knowledge and belief.  AME HARBOP PIMP & DRILLING CO., (Person, firm, or corporation) (Type or ddress, 11302 Burnham Dr. 11W Gig Harborn Co.)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology Second Copy—Owner's Copy Third Copy—Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

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Permit No				
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(2) LOCATION OF	I 1	C4 Th +C>	9 E 11 - 11	RA C			8336
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(3) PROPOSED USE	Domestic Industrial	Municipal 🗆		LOG or ABANI			
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(4) TYPE OF WORK	(. Owner's number of well		with at least on	e entry for each chang	e of information.		
	" (If more than one) sw well      Method: Dug   [	□ Bored □		MATERI	<u> </u>	FROM _	; TO
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	econditioned  Rotary L		NA~ 1	<u></u>		//2	33
(5) DIMENSIONS: [	Diameter of well	inches.	Hart	- F 37~	1 5.00	-3 33	35
Drilled 15/	_feet. Depth of completed well	<u> 151 h.</u>	Clan -	1.3	100	1135	112
(6) CONSTRUCTION	N DETAILS:		11.11	<del></del>		/22	128
Casing installed:		t. 10 /4 GP H.	54-1	+ France	11101	128	151
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Liner installed 🔲 Threaded	* Diam. from	t. tofi.					
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Type of perforator use							<del></del>
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Material used in seaf							<del>-</del>
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(7) PUMP: Manufact	urer's Name Golf d's	H.P. 3/4	<b>—</b>	-			
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(8) WATER LEVEL	.5: above mean sea level	) - 71- 91 n.					
Static level	7 H. below top of well. Date						
Artesian pressure							
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Start Card No. 065839 Water Right Permit No.

======================================	444 60	MSET DR S TACCHA, NA 98465-	
(2) 10CATION OF MELL: County PIERCE		- 能 1/4 報 1/4 Sec 17 T 2	
(2a) STREET ANDRESS OF WELL (or mearest addresses (2a) PROPOSED OSE: NOMESTIC	****	(In) After the	
(4) TYPE OF WORK: Owner's Mumber of (If more than one)	well	Formation: Buscribe by color, ch and structure, and show thicknes and nature of the material in ea at least one entry for each chan	ch stratum penetrated, with
MEN MELL Rethod: AIR RUIARI (5) DIMENSIONS: Diameter (6)  Drilled 33 ft. Depth of complete		SANDY TOPSOIL	1 G ; Z
(6) CONSTRUCTION DETAILS: Casing installed: 6 Dia. from 0 WELDED Dia. from Dia. from Dia. from	ft. to 47 ft. i	SAND AND SOME GRAVEL COMPACTED SAND COMPACTED SAND AND CLAY SEEPAGE SAND CLAY MAROPAN	9 14 14 24 24 26 26 42
Perforations: NO Type of perforator used SIZE of perforations in. perforations from ft. to perforations from ft. to perforations from ft. to	by in.	MATER SAND & GRAVEL BIRTY SAND	47 47 53
21 681 21 7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ft. ta ft. ft. to ft.	•	
Gravel packed: NO Size of the Size of the Gravel placed from the state of the size of the	of gravel		
Surface seals YES To wind Material used in seal BENTONITE CLAY Did any strata contain mousable water Type of Water? Depti Method of sealing strata of	of whate		
(7) PURP: Hanufacturer's Hame			
above seam se  Static devel 20 ft. heles see o  Artesian Pressure lbs. per square  Writesian water controlled by	elevation a level a level and Date 12/46/90 inch Date and day	Mark 11990/80	Completed 12/03/90
(9) WELL TESTS: Drawdown is amount water le static level. Was a pump test made? NO If yes, by wh Yield: gal./min with it. draw	ions	I constructed and/or accept	responsibility for con- its compliance with all n standards. Materials used
Recovery data Time Water Level Time Water Level	Time Water Level	NAME RICHARDSON WELL DRILLING (Person, fira, or corpora	tion) (Type or print)
Date of test // Bailer test 30 gal/min. 25 ft. draw Air test gal/min. w/ stem set at Artesian flow g.p.m. Temperature of water Was a chemic	it. for mis.	ADDRESS PO BOX 44427 TAC WA 98	License No. 0284

1.0

File Original and First Copy with Department of Ecology Second Copy — Owner's Copy Third Copy — Driller's Copy

Temperature of water 50 Was a chemical analysis made? Yes X

ECY 050-1-20 (9/93) \*\*1

## **WATER WELL REPORT**

STATE OF WASHINGTON

Start Card No. W052689

UNIQUE WELL I.D. # ABP815 Water Right Permit No.

(1)	OWNER: Name PEDRO AND WENDY PINTO Add	22404 Military Road S., Sea-Tac, WA 98198						
(2)	LOCATION OF WELL: County Pierce	NW 1/4 NE 1/4 Sec 17 T 22 N. F 2E W.M.						
_	STREET ADDRESS OF WELL (or neerest address) off Crescent Va.							
(3)	PROPOSED USE:	(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION  Formation: Describe by color, character, size of material and structure, and show thickness of equifiers						
<u> </u>	TYPE OF WORK: Owner's number of well	and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.						
(-)	(If more than one)	MATERIAL FROM TO						
	Abandoned   New well     Method: Dug   Bored							
	Reconditioned	Brown topsoil 0 4						
(5)	DIMENSIONS: Diameter of well 6 inches.	Gray hardpan 4 27						
• •	Drilled 178 feet. Depth of completed well 178 ft.	Gray silty sand & gravel 27 69						
<b></b>	ACHATRIATION DUTAIL C.	Gray hardpan 69 93						
(6)	CONSTRUCTION DETAILS:  Casing installed: 6 Diem. from 0 ft. to 178 ft.	Gray silty sand & gravel 93 131 Gray hardpan 131 164						
	Casing installed: Diam. from ft. to ft. to ft. to ft.							
	Liner installed   Threaded   Diam. fromft. toft.							
		Gray silty coarse sand & 167 178						
	Perforations: Yes No X	graver, nzo						
	Type of perforator usedin. byin.							
	perforations fromft. toft.							
	perforations fromft. toft.							
	perforations fromft. toft.							
	Screens: Yes No X							
	Type Model No	ν <u>-</u>						
	Diam. Slot size from ft. to ft.							
	Diam.         Stot size         from         ft. to         ft.	3 B						
	Gravel packed: Yes No XX Size of gravel							
	Gravel placed from	3 01						
	Surface seal: Yes X No To what depth? 18 ft.	- 10 No.						
	Material used in seal <u>Bentonite</u> Did any strata contain unusable water? Yes No X	#1. <b>8</b> C						
	Type of water? Depth of strata	- 00						
	Method of sealing strate off							
_	PUMP: Manufacturer's Name Goulds							
(7)	PUMP: Manufacturer's Name Goulds  Type: submersible 10GS10 H.P. 1							
(8)	WATER LEVELS: Land-surface elevation above mean eas level	Work Started 4/26/95 19 Completed 4/27/95 19						
	Static level107 ft. below top of well Date5/02/95	WELL CONSTRUCTOR CERTIFICATION:						
	Artesian pressure lbs. per square inch   Date							
	Artesian water is controlled by (Cap, valve, etc.)	I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and						
(9)	WELL TESTS: Drawdown is amount water level is lowered below static level	the information reported above are true to my best knowledge and belief.						
(-/	Was a pump teal made? Yes X No  1f yes, by whom? Gresham	NAME Gresham Well Drilling, Inc.						
	Yield: 15 gal./min. with 18 ft. drawdown after 2 hrs.	NAME Gresham Well Drilling, Inc. (PERSON, FRAM OR CORPORATION) (TYPE OR PRINT)						
_	n 11 11 11 11	Address 3105 NW Lakeness Rd., Poulsbo, WA 9837						
_	и и и и	(Signed) he have License No. 0761						
	Recovery data (time taken as zero when pump turned off) (water level measured from well	(Signed) (WELL DRILLER) LICENSE NO. 0701						
	top to water level) Time Water Level Time Water Level Time Water Level	Contractor's						
	Full recov. in 5 min.	Registration CRECHUDOSSRC - 5/04/05						
		No. GRESHWDOJJDC Date						
	Date of test 5/02/95	(USE ADDITIONAL SHEETS IF NECESSARY)						
	Bailer test gal./min. with ft. drawdown after net at 20+ gal./min. with stem set at 170 ft. for 1 hrs.	Ecology is an Equal Opportunity and Affirmative Action employer. For spe-						
	Artesian flow g.p.m. Date	cial accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.						
	Towards at water 50 Mars a sharing analysis made? You X	ייטיסטי. ווופ דיטט מעוווטפרוס (בטטן איטר־טטטט.						

No 🗆

File Original and First Copy with Department of Ecology Second Copy — Owner's Copy

ECY 050-1-20 (9/93) \* \* 1

## **WATER WELL REPORT**

Start Card No. W053930

UNIQUE WELL I.D. . ABP828

	ond Copy — Owner's Copy d Copy — Driller's Copy	VASHINGTON Water Right Permit No		
(1)	OWNER: Name MARK KNOWLES Add	21600 24TH AVE.S.#E101, DES MOINE	S.WA 9	8198
(2)	LOCATION OF WELL: County PIERCE	. NW 1/4 NE 1/4 Sec 17 T. 2	22 <sub>N. R</sub>	2E w.m
(2a)	STREET ADDRESS OF WELL (or nearest address) 15821 28TH AVEN			
(3)	☐ Irrigation → □	(10) WELL LOG or ABANDONMENT PROCEDURE D Formation: Oescribe by color, character, size of material and structure, and		
	□ DeWater Test Well □ Other □	and the kind end nature of the material in each stratum penetrated, with change of information.		
(4)	TYPE OF WORK: Owner's number of well (If more than one)	MATERIAL	FROM	то
	Abandoned New well X Method: Dug Bored Deepened Cable Driven  Reconditioned RetaryXX Jetted	OVERBURDEN	0	4
(5)	DIMENSIONS: Diameter of well 6 inches.	GRAY HARDPAN	4	28
` '	Dnilled 119 feet. Depth of completed well 119 ft.	GRAY SAND & GRAVEL	28	52
(6)	CONSTRUCTION DETAILS:	BLUE CLAY	52	78
(0)	Casing Installed: 6 Diam. from 0 ft. to 119 ft.	GRAVEL, H2O - 2GPM GRAY HARDPAN	78 79	79 112
	Welded Diam from ft. to ft.	GRAVEL, H20	112	119
	Liner installed Threaded Dlam. from ft. to ft.	GRAVEL, 1120	112	119
	Perforations: Yes No [X]			
	Type of perforator used			
	SIZE of perforations in. by In.			
	perforations fromft. toft.			<u>.</u>
	perforations from			
			-	
	Screens: Yes No XX		-	
	Manufacturer's Name Model No		<u> </u>	
	Diam. Skot size from ft. to ft.		<del>                                     </del>	
	Diam. Slot size from ft. to ft.			
	Gravel packed: Yes No 🕮 Size of gravel	P 1		
	Gravel placed fromft. toft.			
	Surface seal: Yes 🕅 No 🗌 To what depth? 18 ft.		<del>                                     </del>	
	Material used in seal BENTONITE	<u> </u>	<del>                                     </del>	
	Did any strata contain unusable water? Yes . No .		1	<del> </del>
	Type of water? Depth of strate		+	
	Method of sealing strata off		<del>                                     </del>	
(7)	PUMP: Manufacturer's Name GOULDS			
	Type: SUBMERSIBLE TOGSIO H.P. 1			
(8)	WATER LEVELS: Land-surface elevation above mean sea level	Work Started 6/07/95, 19. Completed 6/07	795	, 19
	Static level 72 It. below top of well Date 6/09/95	WELL CONSTRUCTOR CERTIFICATION:		
	Artesian pressure   bs. per square inch Date	I constructed and/or accept responsibility for construction	n of this we	all and its
	(Cap, valve, etc.)	compliance with all Washington well construction standard	is. Materials	used and
(9)	WELL TESTS: Drawdown is amount water level is lowered below static level	the information reported above are true to my best knowled	ge and belie	л.
	Was a pump test made? Yes XX No I If yes, by whom? GRESHAM  Vield: 15 and /min with 5 If drawdown after I bra	NAME GRESHAM WELL DRILLING, INC	O DOME	
	Troig gas/fills, with is drawed to the in a	3105 NW LAKENESS RD., POULS		98370
_	n n n			
	Recovery data (time taken as zero when pump turned off) (water level measured from well	(Signed) Light WELL DRILLER) Licen	ıse No. <u>07</u>	761
	top to water level)	(METT OWNTER)		
	Time Water Level Time Water Level Time Water Level FULL RECOV. IN 2 MIN.	Contractor's Registration CDECULDOESDC 6/16/05		
		Registration GRESHWD055BC Date 6/16/95		_, 19
	6/00/05	(USE ADDITIONAL SHEETS IF NECESS	SARY)	
	Date of test 6/09/95  Bailer test gal/min, with tt. drawdown after hrs.		_	
	Bailer test gal./min. with ft. drawdown after hrs. Airtest 20 gal./min. with stem set at 115 ft. tor 1 hrs.	Ecology is an Equal Opportunity and Affirmative Action	employer.	For spe-
	Artesian flow g.p.m. Date	cial accommodation needs, contact the Water Resource 407-6600. The TDD number is (206) 407-6006.	as Program	n at (206)
	Temperature of water <u>50</u> Was a chemical analysis made? Yes <b>D</b> . No	407-0000. The FDD humber is (200) 407-0000.		

WATER WELL REPORT	CURRENT Notice of Intent No. W06159.	5	
Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller	Unique Ecology Well ID Tag No. #131	7-06	4
Construction/Decommission ("x" in circle)			
© Construction	Water Right Permit No.		
O Decommission ORIGINAL CONSTRUCTION Notice  127549 of Intent Number	Property Owner Name JOE JAW		_
PROPOSED USE: Domestic Industrial Municipal	Well Street Address 18826 28	& DUS	14.41
DeWater Irrigation Test Well Other	Well Street Address 185 AG 16	Dicent.	~ · · · · · · · · · · · · · · · · · · ·
TYPE OF WORK: Owner's number of well (if more than one)	City GIQ WARBOR County:_	FILICIA	e (EWM)
New Well Reconditioned Method Dug Bored Driven	Location NE1/4-1/4 NW1/4 Sec. 7 T	wn 22 R.	or
☐ Deepened ☐ Cable ☐ Rotary ☐ Jetted	Lat/Long: Lat Deg		WWM
DIMENSIONS: Diameter of well 6 inches, drilled 102 ft	(S,t,r Still		
Depth of completed well 103 ft	REQUIRED) Long Deg Tax Parcel No. 6277171054		c
CONSTRUCTION DETAILS			
Casing Welded 6 Diam from 6 ft. to 103 ft Installed: Liner installed Diam from ft. to ft	CONSTRUCTION OR DECOMMISSION Formation Describe by color, character, size of management of the color of the c		
	kind and nature of the material in each stratum pen	etrated, with a	t least one
	entry for each change of information Indicate all values ADDITIONAL SHEETS IF NECESSARY.		red
Perforations:  Yes No Type of perforator used	MATERIAL		OT
SIZE of perfsin_byin_ and no_ of perfsfromft_toft		FROM	4
Screens: Yes No K-Pac Location 73	Top soil	4	11
Manufacturer's Name	clay-gravel		16
Type Stainless Stee! Model No	brown sand	16	47
Diam 3" Slot Size 10 from 102 ft to 96 ft		47	83
DiamSlot Sizefromft toft	gravel-sand-clay	83	85
Gravel/Filter packed: Yes No Size of gravel/sand	gray clay - sand		96
Materials placed fromft_toft.	gravel-sand-clay	96	102
Surface Seal: Yes No To what depth? 19 ft  Materials used in seal Benlounile	'sand gray wise'	76	102
Did any strata contain unusable water? Yes No			<del></del>
Type of water? Depth of strata			
Method of sealing strata off		<u></u>	ļ
PUMP: Manufacturer's Name			
Type H P			
WATER LEVELS: Land-surface elevation above mean sea levelft.			
Static level 65ft below top of well Date			
Artesian pressurelbs per square inch			
(cap,valve, etc)			
WELL TESTS: Drawdown is amount water level is lowered below static level			_
Was a pump test made? Was Ves No If yes, by whom?			<u> </u>
Yield 10 gal/min with 25' ft drawdown after 2 hrs			
Yield gal/min with ft drawdown after hrs Yield gal/min with ft drawdown after hrs	H REC	TIVE	<b>'</b>
Recovery data (time taken as zero when pump turned off)(water level measured from		/1 V 1	
well top to water level) Time Water Level Time Water Level Time Water Level	JAN	6 2003	
1500 Hip 775	2.114	1000	
7 m/m - 67	Washin	gton Stati	
Date of test	Departme	ot of Ecol	ngv
Bailer test 12 gal/min with ft drawdown after 2 hrs  Airtest gal/min with stem set at ft for hrs	•	3401	~ &J
Artesian flowg p m Date	- /2/1//04	min	2/21
Temperature of waterWas a chemical analysis made? Yes No	Start Date 2 4 (02 Completed Da	te 4/2/20	102
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responses Washington well construction standards. Materials used and the information re	ported above are true to my best knowledge ar	ompliance wi	th all
■ Driller ☐ Engineer ☐ Trainee Name (Print) Bruce Lewis	Drilling Company HRABOR TUNE	D Con.	enc
Driller/Engineer/Trainee Signature Bruce Louis	- Address RO. Box 330	/	
Driller or Trainee License No. 2627	- 1/ - / - / - / - / - / - / - / - / - /	and a	375
	City, State, Zip BUR BU UK	782	1/
If trainee, licensed driller's	Registration No. 10/Bo PC/14046	<sub>ate</sub> 1/13	03
Signature and License no	Ecology is an Equal Opportunity Employer	1 6	(Rev 4/01)

WATER WELL REPORT	Notice of Intent No. W/62612
Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller	Unique Ecology Well ID Tag No. ACF 533
Construction/Decommission ("x" in circle)	
© Construction O Decommission ORIGINAL CONSTRUCTION Notice	Water Right Permit No.
130700 of Intent Number	Property Owner Name ANN Lemie ux
PROPOSED USE: '☑ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other	Well Street Address 15625 Oves Centry Dr NW
	City Org Hawhon County: Pierce  Location 1 = 1/4 1/4 NE 1/4 Sec 17 Twn 22 R 2 EWN circle  or one
TYPE OF WORK: Owner's number of well (if more than one)	Location NE 1/4-1/4 NE 1/4 Sec 17 Twn 22 R 2 EWN curc
Deepened Z Cable Rotary Jetted	I wwm
DIMENSIONS: Diameter of well 6 inches, drilled 2/8 ft	Lat /Long: Lat Deg Lat Min/Sec
Depth of completed well 2/8 ft	REQUIRED) Long Deg Long Min/Sec
CONSTRUCTION DETAILS	Tax Parcel No. 0220 171065
Casing Welded 6 Diam from 1/ ft to 2/3 ft	CONSTRUCTION OR DECOMMISSION PROCEDURE
Installed: Liner installed" Diam fromft toft  Threaded" Diam fromft toft	Formation Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one
	entry for each change of information Indicate all water encountered
Perforations: Yes No Type of perforator used	(USE ADDITIONAL SHEETS IF NECESSARY ) TO TO TO
SIZE of perfs <u>and by</u> in. and no of perfs from ft to ft	TROM
Screens: X Yes No K-Pac Location	Top soil 0 1 Sand & gravel 1 5
Manufacturer's Name	gravely Hardpan 5 60
Type	Hard San 60 88
Diam Slot Size from ft to ft	Sand 88 91
Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand	Clayish Hardpan + grand 91 194
	Fine Sand 194 210
Materials placed fromft toft.  Surface Seal:  Yes  No , To what depth ft ft	3and 210 218
Materials used in seal Holeplus	
Did any strata contain unusable water? Yes No	
Type of water <sup>9</sup> Depth of strata	
Method of sealing strata off	
PUMP: Manufacturer's Name Gould  Type Submersible HP 3/4	APR 0 4 2003 2 - 1
WATER LEVELS: Land-surface elevation above mean sea level ft	DEPARTMENT OF SOCIOON ST
Static level 92.5 ft below top of well Date 3/5/03	DEPARTMENT OF ECOLOGY COM
Artesian pressurelbs per square inch Date	
Artesian water is controlled by (cap,valve, etc)	20 -
WELL TESTS: Drawdown is amount water level is lowered below static level	MG 00
Was a pump test made? Yes \( \sum_{No} \) If yes, by whom? \( \text{by Driller} \)	1 13
Yield /6 gal/min with 45 ft. drawdown after / hrs Yield gal/min with ft drawdown after hrs	
Yieldgal/min withft drawdown afterhrs Yieldgal/min withft drawdown afterhrs	
Recovery data (time taken as zero when pump turned off)(water level measured from	
well top to water level) Time Water Level Time Water Level Time Water Level	
8 to 137 2010 92.5	
15.00 110	
Date of test	
Bailer testgal/min_withft. drawdown afterhrs Airtestgal/min_with stem set atft forhrs	
Artesian flowg p m Date	Start Date 2/17/03 Completed Date 3/4/03
Temperature of waterWas a chemical analysis made? Yes No	
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsible with the information of the informa	onsibility for construction of this well, and its compliance with all
Donller Dengineer Trainee Name (Print) Wesley Glessier	Drilling Company Wes Glessher Drilling
Driller/Engineer/Trainee Signature Wesley Glessie	_ Dining Company Wes (Flessive Firiting
	The second secon
Driller/Engineer/Trainee Signature	— Address <u>Po Box 487</u>
Driller or Trainee License No. 0154	
Driller or Trainee License No. 0/54  If trainee, licensed driller's	- Address 10 1302 487  - City, State, Zip Buvley Wa 983 ZZ  Contractor's  Registration No. WESCI Die 682 Plate 3/5/63

WATER WELL REPORT Original & 1 <sup>st</sup> copy – Ecology, 2 <sup>nd</sup> copy – owner, 3 <sup>rd</sup> copy – driller	CURRENT		
Original & 1 Copy - Ecology, 2 Copy - Owner, 3 Copy - driner	Notice of Intent No. WEO7604		
Construction Construction Construction Construction Construction Construction			
	Unique Ecology Well ID Tag No. <u>BAT439</u>		
Decommission ORIGINAL INSTALLATION  Notice of Intent Number	Water Right Permit No.		
PROPOSED USE:  Domestic  Industrial  Municipal	Property Owner Name WILLIAM SARNO		
☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other	Well Street Address15905 28 <sup>TH</sup> AVE NW		
TYPE OF WORK: Owner's number of well (if more than one)	City GIG HARBOR County PIERCE		
New well       ☐ Reconditioned       Method       ☐ Dug       ☐ Bored       ☐ Driven         ☐ Deepened       ☐ Cable       ☒ Rotary       ☐ Jetted	Location <u>NW</u> 1/4-1/4 <u>NE</u> 1/4 Sec <u>17</u> Twn <u>22</u> R <u>2E</u>	EWM	_
DIMENSIONS: Diameter of well 6 inches, drilled 148 ft.  Depth of completed well 148 ft.	(s, t, r Still REQUIRED)	o ww	or 'M □
CONSTRUCTION DETAILS	Lat/Long Lat Deg Lat Min/Sec		
Casing ⊠ Welded <u>6</u> " Diam. from <u>0</u> ft. to <u>233</u> ft.  Installed: □ Liner installed " Diam. from ft. to ft	Long Deg Long Min/Sec		
Installed:         ☐ Liner installed         " Diam. fromft. toft           ☐ Threaded         " Diam Fromft. toft.	Tax Parcel No. (Required)0222175005		
Perforations:  Yes No			
Type of perforator used	CONSTRUCTION OR DECOMMISSION PROC Formation: Describe by color, character, size of material and struct		kind and
SIZE of perfsin. byin. and no. of perfsfromft. toft.           Screens:	nature of the material in each stratum penetrated, with at least one of information. (USE ADDITIONAL SHEETS IF NECESSARY.)	entry for eac	
Manufacturer's Name JNSN	MATERIAL	FROM	TO
Type SS Model No. TELES	PIPE STICK UP	0	1
Diam. <u>5"Slot size 18 from 143 ft. to 148 ft.</u>	BROWN SAND, CLAY, GRAVEL	1	16
Diam Slot size from ft. to ft.	GRAY SAND, GRAVEL, WET	16	21
Gravel/Filter packed: ☐ Yes ☒ No Size of gravel/sand	BROWN SAND, GOME GRAVEL, WET	21	41
Materials placed from ft. to ft.	GRAY SAND, CLAY, GRAVEL,	41	
Surface Seal:   ✓ Yes   ✓ No To what depth? 18 ft	SEAMS WET	61	61 85
Material used in seal <u>BENTONITE</u>	GRAY SILT, SAND, GRAVEL GRAY SAND, GRAVEL, SEAMS WATR	85 85	109
Did any strata contain unusable water? ☐ Yes ☒ No	GRAY SILT, SAND, GRAVEL, CLAY	109	140
Type of water? Depth of strata	GRAY SAND, GRAVEL, SEAMS WATR	140	148
Method of sealing strata off			<del>                                     </del>
PUMP: Manufacturer's Name			
Type: H.P.			
WATER LEVELS: Land-surface elevation above mean sea level ft.			ļ
Static level 83ft below top of well Date 11/13/2007		-	ļ
Artesian pressure lbs. per square inch Date		<u> </u>	
Artesian water is controlled by (cap, valve, etc.)		<u> </u>	<del> </del>
WELL TESTS: Drawdown is amount water level is lowered below static level			+
Was a pump test made?  Yes  No If yes, by whom?			
Yield:gal./min. withft. drawdown afterhrs.			
Yield:al/min. withft. drawdown afterhrs.			
Yieldgal./min. withft. drawdown afterhrs.  Recovery data (time taken as zero when pump turned off) (water level measured from well			-
top to water level) Time Water Level Time Water Level Time Water Level			
	DEC 1 0 300	17	
	¥¥77	1	<del> </del>
	Washington St	ate	+
Date of test	Department of Ec	<del> ology  </del>	+
Bailer test 15 gal./min. with 24 ft drawdown after 1 hrs.			
Airtestgal./min. with stem set atft. forhrs.			
Artesian flowg.p.m. Date	Start Date 11/7/2007 Completed Date 1	1/13/200	<u> </u>
Temperature of water Was a chemical analysis made?			
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept resp construction standards. Materials used and the information reported above are to	consibility for construction of this well, and its compliance with a crue to my best knowledge and belief.	ll Washing	ton well
☑ Driller ☐ Engineer ☐ Trainee Name (Print ) JOHN SULLIVAN	Drilling Company NICHOLSON DRILLING INC		
Driller/Engineer/Trainee Signature	Address PO BOX 123		
Driller or trainee License No. 2218		117.	0026
Entire of trainer Electric (vo. 2216	City, State, Zip PORT ORCHARD	, WA	1, 98366

Contractor's

IF TRAINEE: Driller's License No:

Registration No. NICHODI1370M Date 11/30/2007

22-6	706-3X
00.0	XC QC!

Ecology is an Equal Opportunity Employer.

WATER WELL REPORT Original & 1 <sup>st</sup> copy - Ecology, 2 <sup>nd</sup> copy - owner, 3 <sup>rd</sup> copy - driller	CURRENT Notice of Intent No. W216866	
E ( 0 L 0 G Y Construction/Decommission ("x" in circle)	Unique Ecology Well ID Tag No. APRO	40
© Construction	Water Right Permit No.  Property Owner Name Swen Weinm	<u> </u>
O Decommission ORIGINAL INSTALLATION Notice	Property Owner Name Swen Weinm	lann
295208 of Intent Number	Well Street Address 15515 30th	AVE NW
PROPOSED USE:   ☐ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other	City Gig Harbor County Pie	erce
	Location $SE_{1/4-1/4} NW_{1/4} Sec_{20} Twn_{22N_1}$	R_2E EWM circle
TYPE OF WORK: Owner's number of well (if more than one)  ☐ New well ☐ Reconditioned	Lat/Long (s, t, r Lat Deg Lat	wwm one Min/Sec
DIMENSIONS: Diameter of well 6 inches, drilled 160 ft.	Still <b>REQUIRED</b> ) Long Deg Lon	g Min/Sec
Depth of completed wellft.  CONSTRUCTION DETAILS	Tax Parcel No. 0222171051	.6
Construction details  Casing $\Sigma$ Welded 6 "Diam from $\pm 1$ ft. to $155$ ft.	Tax Talcel No. Out 19 19 19 19	
Casing              ∑             ☐ Welded         6         " Diam from +1 ft. to 1.55 ft.	CONSTRUCTION OR DECOMMISSION	
Perforations:  Yes X No	Formation: Describe by color, character, size of material and s nature of the material in each stratum penetrated, with at least of	
Type of perforator used in. by in. and no. of perfs from ft. toft.	information. (USE ADDITIONAL SHEETS IF NECES	
Screens:   Yes  No  Kreac Location 154	MATERIAL	FROM TO
Manufacturer's Name Johnson	Brown sand	0 37
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Grey till Grey clay	37 132
Gravel/Filter packed: ☐ Yes 反 No ☐ Size of gravel/sand	Grey clay	132 136
Surface Seal: 🖫 Yes 🗆 No To what depth? 18 ft.  Material used in seal Bentonite	Grey sand	136 145
Did any strata contain unusable water?	Grey sand w/b	145 160
Type of water? Depth of strata	• • • • • • • • • • • • • • • • • • • •	143 100
Method of sealing strata off	Grey tight sand	160
PUMP: Manufacturer's Name Goulds Type Submersible HP 1		
WATER LEVELS: Land-surface elevation above mean sea level		
Static level $108$ ft. below top of well Date $10/25/07$		מ
Artesian pressure lbs. per square inchr Date	RECEIVE	
Artesian water is controlled by(cap, valve, etc.)		1
WELL TESTS: Drawdown is amount water level is lowered below static level	DEPT. OF EGO	OGY
Was a pump test made? So Yes  No If yes, by whom? Olsen Dr1.	-PT OF EGO	WG.
Yield: gal /min. with ft. drawdown after hrs.	DEPT	
Yield: gal/min. withft. drawdown afterhrs.  Recovery data (time taken as zero when pump turned off) (water level measured from well		
top to water level)	-	<del></del>
Time Water Level Time Water Level Time Water Level  0 117 3 m 108		
1-m -111!		
2 m - 104'		
Bailer test 10 gal./min. with 8 ft. drawdown after 2 hrs.	·	
Airtest gal./min. with stem set atft. forhrs.		
Artesian flowg.p.m. Date		
Temperature of water Was a chemical analysis made? ☑ Yes ☐ No	Start Date 9/20/07 Complete	d Date 10/25/07
WELL CONSTRUCTION CERTIFICATION: I constructed and/or acc		
Washington well construction standards. Materials used and the information	n reported above are true to my best knowledge an	d belief.
Driller DEngineer DTraince Name(Print) Matt Olsen	Drilling Company <u>Olsen Drilling</u>	
Driller/Engineer/Trainee Signature	Address PO Box 1554	
Driller or trainee License No. 2337		WA 98366
If TRAINEE, Driller's Licensed No.	Contractor's Registration No. OLSEND101LJ	Date11/9/07

Driller's Licensed No. Driller's Signature \_

he	Well Log Data and Image are 'As Is' with I	NO Warranty. Well Log ID:	he species	rest.
	339850			
Еиљ (	Original and Flort Cook with	Start Card No	34136	
Depa	entiment of Ecology VAIEK WE	LL RÉPORT UNIQUE WELL I.D. #	KA 621	
	ond Copy — Owner's Copy I Copy — Driller's Copy STATE OF W	VASHINGTON Water Right Permit No		
(1)	OWNER: Name Hall Storie, Which Add	rose 4911 No. Stideller Tacona W	W.	-
···			<del>-`</del>	$\equiv$
	STREET ADDRESS OF WELL (or nearest address) 3025 / STREET ADDRESS OF WELL (or nearest address)	T.N.W. , Lig Harbor, WA.		<u>~</u> w.м.
(3) PROPOSED USE: Domestic Industrial   Municipal   (10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION				
	☐ Imgation ☐ DeWater Test Welt ☐ Other ☐	Formation: Describe by color, character, size of material and structure, and sho and the kind and nature of the material in each stratum penetrated, with at le		
(4)	TYPE OF WORK: Owner's number of well (If more than one)	change of information.		
	Abandoned   New well 🔀 Method: Dug 🗆 Bored 🗀			TO
	Deepened ☐ Cable ☐ Driven☐  Reconditioned ☐ Rotary ☐ Jetted ☐		0 2 11	
(5)	DIMENSIONS: Diameter of well 6" inches.		11. 31	
(-/	Drilled 53 teet. Depth of completed well 53 ft.	small situater Consider		
·C\	OCNOTRICATION DETAIL O.	Sitty Bray Sands Sich;	31 31	
(6)	CONSTRUCTION DETAILS:  Casing installed: 6" Dram from +2 to 53 to	Grackes of Engls aredar Bring 3	6 5	3
	Welded Z Diam from 1. to 1.			
	Liner installed Threaded Diam, from h. to ft.		<del></del>	
	Perforations: Yes No 🗹		<del></del>	
	Type of perforator used	· · · · · · · · · · · · · · · · · · ·		
	SIZE of perforations in. byin.			
	perforations from ft. to ft.			
	perforations fromft toft.			
	perforations from tt. to ft.			
	Screens: Yes No 🔀			
	Manufacturer's Name Model No	9	<del>-</del>	-
	Type         Model No.           Diam.         Slot size         from         ft. to         ft.			
	Diam. Slot size from It. to ft.	<u> </u>		
<u> </u>	Gravel packed: Yes No X Size of gravel			
	Gravel placed fromtt. tott.		·	
	Surface seel: Yes XI No To what depth? 19.5 t.			
	Surface seel: Yes No To what depth?	52 8 0		
	Did any strata contain unusable water? Yes . No . No .	7		<u>.</u>
	Type of water? Depth of strata		<u>·</u>	
	Method of sealing strata off	`	<del></del>	
(7)	PUMP: Manufacturer's Name			
(8)	WATER LEVELS: Land surface elevation			
	Static level 22 th. below top of well. Date Nov. 3,199	<u>*</u>		
	Artesian pressure tos per square inch Date	, , ,		
_	Artesian water is controlled by(Cap, valve, etc.)	Wark Started MV 2 19 Campleled Wisc	<u> </u>	999
(9)	WELL TESTS: Drawdown is amount water level is lowered below static level  Was a pump test made? Yes No If yes, by whom?  Yield: gel./min. with tt. drawdown after hrs.	WELL CONSTRUCTOR CERTIFICATION:	المني ماط	

	the information reported above are title to my best knowledge and belief.			
•	NAME HOLF Tasting Inc.			
	(PERSON, FIRM OF CORPORATION) (TYPE OR PRINT)			
	Address 106 71 Todd Kd. , Juva/140			
	(Signed) Card Minimum License No. 2/98			
	(WELL ORLLER)			
	^44			

(USE ADDITIONAL SHEETS IF NECESSARY)

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

	Construction/Decommission ("x" in circle)
Construc	
☐ Decomm	nission ORIGINAL INSTALLATION
	Notice of Intent Number WE21844
	E:  Domestic   Industrial   Municipal  Test Well   Other
TVPE OF WOR	K: Owner's number of well (if more than one)
New well Deepened	☐ Reconditioned Method:☐ Dug ☐ Bored ☐ Driver☐ Cable ☐ Rotary ☐ Jetted
DIMENSIONS:	Diameter of well 6 inches, drilled 98 ft.
	Depth of completed well 98 ft.
CONSTRUCTIO	
	Velded 6 " Diam. from 0 ft. to 96 ft.
	iner installed " Diam. from ft. to ft.
	hreaded "Diam. From ft. to ft.
Perforations:	
	used
	in. byin. and no. of perfsfromft. toft.
Screens: Ye	s No K-Pac Location
Manufacturer's Na	ame JOHNSON
	LESS STEEL Model No. TELESCOPE
	t size 16 from 93 ft. to 98 ft.
Diam. Slo	t size from ft. to ft.
	ked: Yes No Size of gravel/sand
Materials placed fi	romft. toft.
Surface Seal: 🔳	Yes No To what depth? 18 ft.
Material used in se	eal Bentonite
18	tain unusable water?
	Depth of strata
Method of sealing	
	turer's Name
	H.P.
	S: Land-surface elevation above mean sea levelft.
	ft. below top of well Date
	lbs. per square inch Date
Artesian water is o	controlled by (cap, valve, etc.)  Drawdown is amount water level is lowered below static level
Vield on	nade? Yes No If yes, by whom?
Yield: ga	l./min. withft. drawdown afterhrs.
Yield: ga	L/min. withft, drawdown afterhrs.
	ne taken as zero when pump turned off) (water level measured from
well top to water l	Level Time Water Level Time Water Level
well top to water l	
Water I Time Water I Date of test	
Time Water I  Date of test  Bailer test  10	

Was a chemical analysis made? 

Yes 
No

#### CURRENT

otice of Intent No. WE21844	W W 6 556 F03-6	
nique Ecology Well ID Tag No. BHY 098		
ater Right Permit No.	259 KG V	
operty Owner Name David and Liz Stanton		
ell Street Address 2811 159th ST CT NW		
ty Gig Harbor County Pierce		
ocation ne 1/4-1/4 ne 1/4 Sec 17 Twn 22 R	2F 1511	M (S)
to the state of the second sec	0	r
Lat/Long	ww	M 🗌
Lat Deg Lat Min	/Sec	
Long Deg Long M	lin/Sec	
Tax parcel No. (Required) <u>02217</u> 5008		
CONSTRUCTION OR DECOMMISSIC Formation: Describe by color, character, size of n and the kind and nature of the material in each str least one entry for each change of information. ( SHEETS IF NECESSARY.)	naterial and str atum penetrate	ucture, ed, with at
MATERIAL	FROM	ТО
Pipe stick up	0	1_
Brown grey fill	11	3
Grey sand gravel clay wet	3	16
Grey sand gravel water Grey sand gravel clay wet	16 34	34 77
Grey sand gravel tray wet  Grey sand gravel water	77	98
REC	EIVĒ	:D
	EIVE	U
MAY	272018	U
	2 7 2016 Depart	ment
MAY WA State	2 7 2016 Depart	ment

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

■ Driller ☐ Engineer ☐ Trainee Name Nic Sample	Drilling Company Nicholson Drilling INC.		
Driller/Engineer/Traince Signature	Address PO BOX 123		
Driller or trainee License No. 2770	City, State, Zip Port Orchard, WA, 98367		
IF TRAINEE: Driller's License No:	Contractor's		
Driller's Signature:	Registration No. NICHODI137OM Date 02/15/2016		

ECY 050-1-20 (Rev 02-2010) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program at 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller
ECOLOGY State of Washington Construction/Decommission ("x" in circle)
state of washington Construction Construction
Decommission ORIGINAL INSTALLATION
Notice of Intent Number WE21843  PROPOSED USE: ■ Domestic □ Industrial □ Municipal
PROPOSED USE: Domestic Industrial Municipal DeWater Irrigation Test Well Other
TYPE OF WORK: Owner's number of well (if more than one)
■ New well       □ Reconditioned       Method : □ Dug       □ Bored       □ Driven         □ Deepened       □ Cable       ■ Rotary       □ Jetted
DIMENSIONS: Diameter of well 6 inches, drilled 151 ft.
Depth of completed well 151 ft.  CONSTRUCTION DETAILS
Casing         ■ Welded         6 " Diam. from 0 ft. to 151 ft.           Installed:         □ Liner installed " Diam. from ft. to ft.
Threaded "Diam. From ft. to ft.
Perforations: Yes No
Type of perforator used
SIZE of perfs in. by in. and no. of perfs from ft. to ft.
Screens: Yes No K-Pac Location
Manufacturer's Name
Type Model No
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.  Gravel/Filter packed: Yes No Size of gravel/sand
Materials placed from ft. to ft.
Surface Seal: Yes No To what depth? 18 ft.
Material used in seal BENTONITE  Did any strata contain unusable water?
Type of water? Depth of strata
Method of sealing strata off
PUMP: Manufacturer's Name
Type: H.P
WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 74 ft. below top of well Date
Artesian pressure Ibs. per square inch Date
Artesian water is controlled by (cap, valve, etc.)
WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes No If yes, by whom?
Yield:gal./min. withft. drawdown afterhrs.
Yield:     _gal./min. with     _ft. drawdown after     _hrs.       Yield:     _gal./min. with     _ft. drawdown after     _hrs.
Yield:gal./min. withft. drawdown afterhrs.  Yield:gal./min. withft. drawdown afterhrs.  Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)
Yield:gal./min. withft. drawdown afterhrs.  Yield:gal./min. withft. drawdown afterhrs.  Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)
Yield:gal./min. withft. drawdown afterhrs.  Yield:gal./min. withft. drawdown afterhrs.  Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)
Yield:gal./min. withft. drawdown afterhrs.  Yield:gal./min. withft. drawdown afterhrs.  Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)
Yield:gal./min. withft. drawdown afterhrs.  Yield:gal./min. withft. drawdown afterhrs.  Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)  Time Water Level Time Water Level Time Water Level
Yield:gal./min, withft. drawdown afterhrs.  Yield:gal./min. withft. drawdown afterhrs.  Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)  Time Water Level Time Water Level Time Water Level  Date of test
Yield:gal./min. withft. drawdown afterhrs.  Yield:gal./min. withft. drawdown afterhrs.  Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)  Time Water Level Time Water Level Time Water Level  Date of test
Yield:gal./min. withft. drawdown afterhrs. Yield:gal./min. withft. drawdown afterhrs. Yield:gal./min. withft. drawdown afterhrs.  Yield:gal./min. withft. drawdown afterhrs.  Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)  Time Water Level Time Water Level Time Water Level  Date of test

#### **CURRENT**

r Right Permit No.		7 - 7 - 7 - 7	
erty Owner Name DAVID STAN	TON		
Street Address 2917 159TH ST	CT NW		
GIG HARBOR County 1	PIERCE		
tion nwl/4-1/4 ne 1/4 Sec 17. Tw	n 22 R	2E EW	/M 🔳
r Still REQUIRED)		O WV	or VM □
at/Long		., .,	
at Deg		n/Sec	
ong Deg	Long M	fin/Sec	-
ax parcel No. (Required) 0222175	007		
CONSTRUCTION OR DEC- formation: Describe by color, charac	agency are not as a part of a		
and the kind and nature of the materia			
east one entry for each change of inf			
SHEETS IF NECESSARY.)  MATERIAL		FROM	ТО
Pipe stick up		0	1
Grey sand gravel clay w	et	1	13
Grey clay	-	13	24
Brown sand silt wet		24	33
Brey sand gravel cley dan	mp	33	109
Grey clay		109	136
Grey sand gravel clay		136	145
Grey coarse sand gravel w	ater	145	151
	W W		<del> </del>
		T.	
	* ** *** ****		
***********			
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	VAIA C	14-4- D-	
		state De	
		cology	SWRC
	OI E	- 57	
	Of E	3,	

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

■ Driller □ Engineer □ Trainee Name NIC SAMPLE	Drilling Company NICHOLSON DRILLING INC.	
Driller/Engineer/Trainee Signature	Address PO BOX 123	
Driller or trainee License No. 2770	City, State, Zip PORT ORCHARD, WA, 98367	
IF TRAINEE: Driller's License No:	Contractor's	
Driller's Signature:	Registration No. NICHODI137OM Date 06/06/2016	





#### MAP LEGEND

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**Water Features** 

Transportation

Background

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Spoil Area

Stony Spot

Wet Spot

Other

Rails

**US Routes** 

Major Roads

Local Roads

Very Stony Spot

Special Line Features

Streams and Canals

Interstate Highways

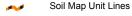
Aerial Photography

### Area of Interest (AOI)

Area of Interest (AOI)

#### Soils

Soil Map Unit Polygons



Soil Map Unit Points

#### Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

... Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

+ Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24.000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pierce County Area, Washington Survey Area Data: Version 11, Sep 9, 2016

Soil map units are labeled (as space allows) for map scales 1:50.000 or larger.

Date(s) aerial images were photographed: Aug 1, 2011—Aug 20. 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## **Map Unit Legend**

Pierce County Area, Washington (WA653)				
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI	
16C	Harstine gravelly ashy sandy loam, 6 to 15 percent slopes	4.5	88.4%	
16D	Harstine gravelly ashy sandy loam, 15 to 30 percent slopes	0.6	11.6%	
Totals for Area of Interest	,	5.1	100.0%	

### Pierce County Area, Washington

# 16C—Harstine gravelly ashy sandy loam, 6 to 15 percent slopes

#### Map Unit Setting

National map unit symbol: 2rtvj Elevation: 200 to 390 feet

Mean annual precipitation: 30 to 55 inches Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 180 to 200 days

Farmland classification: Prime farmland if irrigated

#### **Map Unit Composition**

Harstine and similar soils: 85 percent Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

#### **Description of Harstine**

#### Setting

Landform: Ridges

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Nose slope

Down-slope shape: Linear Across-slope shape: Convex

Parent material: Sandy glacial drift with an influence of volcanic

ash over dense glaciomarine deposits

#### **Typical profile**

Oi - 0 to 0 inches: slightly decomposed plant material Oe - 0 to 1 inches: moderately decomposed plant material

Bw1 - 1 to 6 inches: gravelly ashy sandy loam Bw2 - 6 to 14 inches: gravelly ashy sandy loam Bw3 - 14 to 22 inches: gravelly ashy sandy loam Bw4 - 22 to 32 inches: gravelly ashy sandy loam 2Cd1 - 32 to 38 inches: gravelly loamy sand 2Cd2 - 38 to 61 inches: gravelly loamy sand

#### **Properties and qualities**

Slope: 6 to 15 percent

Depth to restrictive feature: 20 to 39 inches to densic material

Natural drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Very

low (0.00 to 0.00 in/hr)

Depth to water table: About 24 to 37 inches

Frequency of flooding: None Frequency of ponding: None

Available water storage in profile: Low (about 4.2 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4s

Hydrologic Soil Group: C

Other vegetative classification: Limited Depth Soils

(G002XN302WA) *Hydric soil rating:* No

#### **Minor Components**

#### Indianola

Percent of map unit: 5 percent Landform: Eskers, kames, terraces

Landform position (three-dimensional): Riser

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

#### Norma

Percent of map unit: 3 percent

Landform: Depressions, drainageways Landform position (three-dimensional): Dip

Down-slope shape: Concave, linear Across-slope shape: Concave

Hydric soil rating: Yes

#### **Dupont**

Percent of map unit: 3 percent Landform: Depressions, troughs

Landform position (three-dimensional): Dip Down-slope shape: Concave, linear Across-slope shape: Concave

Hydric soil rating: Yes

#### Neilton

Percent of map unit: 2 percent Landform: Outwash terraces

Landform position (three-dimensional): Riser

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

#### Mckenna

Percent of map unit: 2 percent

Landform: Depressions, drainageways Landform position (three-dimensional): Dip Down-slope shape: Concave, linear

Across-slope shape: Concave

Hydric soil rating: Yes

## **Data Source Information**

Soil Survey Area: Pierce County Area, Washington

Survey Area Data: Version 11, Sep 9, 2016

### Pierce County Area, Washington

# 16D—Harstine gravelly ashy sandy loam, 15 to 30 percent slopes

#### **Map Unit Setting**

National map unit symbol: 2rtvk Elevation: 200 to 390 feet

Mean annual precipitation: 30 to 55 inches Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 180 to 200 days

Farmland classification: Farmland of statewide importance

#### **Map Unit Composition**

Harstine and similar soils: 90 percent Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

#### **Description of Harstine**

#### Setting

Landform: Ridges

Landform position (two-dimensional): Backslope Landform position (three-dimensional): Side slope

Down-slope shape: Linear Across-slope shape: Convex

Parent material: Sandy glacial drift with an influence of volcanic

ash over dense glaciomarine deposits

#### Typical profile

Oi - 0 to 0 inches: slightly decomposed plant material Oe - 0 to 1 inches: moderately decomposed plant material

Bw1 - 1 to 6 inches: gravelly ashy sandy loam Bw2 - 6 to 14 inches: gravelly ashy sandy loam Bw3 - 14 to 22 inches: gravelly ashy sandy loam Bw4 - 22 to 32 inches: gravelly ashy sandy loam 2Cd1 - 32 to 38 inches: gravelly loamy sand 2Cd2 - 38 to 61 inches: gravelly loamy sand

#### Properties and qualities

Slope: 15 to 30 percent

Depth to restrictive feature: 20 to 39 inches to densic material

Natural drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Very

low (0.00 to 0.00 in/hr)

Depth to water table: About 24 to 37 inches

Frequency of flooding: None Frequency of ponding: None

Available water storage in profile: Low (about 4.2 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: C

Other vegetative classification: Limited Depth Soils

(G002XN302WA) *Hydric soil rating:* No

### **Minor Components**

#### Indianola

Percent of map unit: 5 percent Landform: Eskers, kames, terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

#### Neilton

Percent of map unit: 5 percent Landform: Outwash terraces

Landform position (three-dimensional): Riser

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

### **Data Source Information**

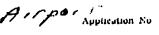
Soil Survey Area: Pierce County Area, Washington

Survey Area Data: Version 11, Sep 9, 2016

# APPENDIX C

File Original and First Copy with Department of Ecology Second Copy — Owner's Copy Third Copy — Driller's Copy

# WATER WELL REPORT



hird Copy — Driller's Copy	STATE OF W	ASHINGTON	Permit	No	······································
(1) OWNER: Name A. L. Hart (Tallm	an)	Address1561	6 Crescent Valle	y Dr. N.	W. Gje
2) LOCATION OF WELL: County Pier					
earing and distance from section or subdivision corner			A		
3) PROPOSED USE: Domestic 🕱 Industrial 🖸	Municipal [	(10) WELL L			
• Irrigation [] Test Well	Other 🛘	Formation: Describ show thickness of c stratum penetrated	e by color, character, size of ma quifers and the kind and natur , with at least one entry for ea	sterial and struct e of the materia sch change of j	cture, and al in each formation.
(4) TYPE OF WORK: Owner's number of well (if more than one)			MATERIAL	FROM	TO
New well G. Method: Dug Despend d Cable		Topsoil			_2
Despend		Sand & gr	avel brown hardp	an 2	37
			<u>&amp; gravel hardpa</u>	n 37	53_
5) DIMENSIONS: Diameter of well	inches.		avel some water	53	_63
Drilled. 90		Gray hard	b <del>ur acme acebate</del>	-63	84
6) CONSTRUCTION DETAILS:		Sand & gr	avel water beari	ng   84	_90
Casing installed: Diam. fromO #	L to85 1. ft.				
Threeded [] Diam. from fi	t. to ft.	-			
Welded 20 " Diam. from ft	i. to				
Perforations: Yes   No   X					
Type of perforator used					<del> </del> -
SIZE of perforations in. by	<u>10.</u>				<del></del> -
perforations from	, 24.			<del></del>	
perforations from	) A.				<del></del>
Screens: Yes D No D Johnson			PECET	VED	
-t-dellar stanlar			<del>\\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </del>	<del>VtD</del>	
Triem 0 Slot size 35 from 65	n. to XU st.				
Dism. Slot size from	tt. to <u>ft.</u>		——— JUN 121	975	
Gravel packed: Yes No Ck Size of gravel			DEPARTMENT OF	ECOLOGY	
			\$951111152 15273	1/1 0= 10=	
Surface seal: Yes D No R To what depth?	R.			70_	<del> </del> .
Material used in seal  Did any strata contain unusable water?	Yes 🗍 No 🖸				ļ,
Type of water! Depth of strat					
Method of sealing strata off					<b>⊢</b>
					<del> </del>
(7) PUMP: Manufacturer's Name	. H.P	<u> </u>		<del></del>	<del> </del>
Type:		<b></b>			+
(8) WATER LEVELS: Land-surface elevation above mean sea level	~ 340 n	<u></u>			<del> </del>
Static level45	te <u>LU=10=0</u>	<b>*</b>			1
Artesian pressure	<b>JE</b>				1
Artesian water is controlled by (Cap. v.	alve, etc.)				
(9) WELL TESTS: Drawdown is amount wat lowered below static leve	ter level is	Work started1	)-13- 19.62. Complete	10-16	- 162
Was a pump test made? Yes \( \text{No} \( \text{No} \) If yes, by whom?					
Yield: gal./min. with ft. drawdown af			ler's statement:		
11 11		This well w	as drilled under my jurisdi t of my knowledge and be	ction and this lief.	report 1
10 db bt		true to the per	P AT HILL THRALIENSE AND DE		
Recovery data (time taken as zero when pump turned measured from well top to water level)  Time Water Level   Time Water Level   Time		name.Har.b	or Pump & Drilli (Person, firm, or corporation)	ngCo	Inc
Time Water Level 11me Water Level 11me	**** **********************************	244	25 46th Ave. N.		
	**** ******************	Address	AUGII AVE	::	983
		$\mathcal{L}$	1 Heater	By:M.	
Date of test 10-16-62		[Signed Sand.	nl Sustan		
Baller test 40 gal/min. with25 ft. drawdown	arternfs.	O#	76		
Artesian flow	det Ver D. No D	License No	22Q1gL.55 Date	-6-11 <del>-</del>	, 19. <i>.7.]</i>

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

## WATER WELL REPORT

STATE OF WASHINGTON

Application No

ermit No		• •
----------	--	-----

	Address 15712 Crescent Valley D	20	<u> </u>
(2) LOCATION OF WELL: County Pierce	HE HE LA Sec. 17 T.	22 <sub>N., R.</sub>	23. w.m.
Bearing and distance from section or subdivision corner			
(3) PROPOSED USE: Domestic Z Industrial   Municipal	(10) WELL LOG:		-1
Irrigation   Test Well   Other	Formation: Describe by color, character, size of materishous thickness of aquifers and the kind and nature of stratum penetrated, with at least one entry for each		
(4) TYPE OF WORK: Owner's number of well (if more than one)	MATERIAL	FROM	70
New well 💢 Method: Dug 🗍 Bored 🗍  Deepened 🖟 Cable 🗍 Driven 🗎	Brown top soil	7	13_
Deepened	Gray Hard pan		<u>! 26</u> · 31
6	Sandy brown hard ran	26_	<del></del>
(5) DIMENSIONS: Diameter of well 6 inches.	Brown sand, some seepage	<u> </u>	38 
Drilled 86 . ft. Depth of completed well 86	Brown sandy clay	138	43 160
(6) CONSTRUCTION DETAILS:	Gray sandy hard pan	<u> 1.43</u>	T-1-
	Gray Hard pan	60	_68 _74
Casing installed: 6 "Diam from 0 ft. to 82 ft.	Gray hard pan with clay	<u>  68 </u>	+ <del>-14</del> · ·
Threaded Welded Ri Diam. from R. to	Gray sand and gravel, -	74	77
weided Ki	water hearing	77	82
Perforations: Yes   No [2]	Hard packed sand & gravel	82	1 <u>86</u>
Type of perforator used	Gray sand & gravel, water	86	100-
SIZE of perforations in. by in.	Gard packed sand & gravel	1-00	<del>,</del>
		┼─	<del> </del>
perforations from ft. to ft.		+	<del> </del>
		<del> </del>	<del>                                     </del>
Screens: Yes M No O Johnson			<del>    -   -   -   -   -   -   -</del>
Manufacturer's Name Type Stainless Steel Model No. 26			<del> </del> -
Diam. 6 Slot size 60 from 82 ft. to 86 ft.		+	<del> </del>
Diam. Slot size from			<del> -</del>
			j <b>-</b>
Gravel packed: Yes O No M Size of gravel:			·
Gravel placed from			<del></del> -
Surface seal: Yes 10 No   To what depth? 18 n.	DECE 137	1 [1	
Material used in seal Bentonite 100 Ibs.	REVEIT	45	
Did any strata contain unusable water? Yes No E			
Type of water? Depth of strata	MAY 22 19	30	
(7) PUMP: Manufacturer's Name. Berkeley	DEPARTMENT OF E	COLCEY	<u> </u>
Type: Submersible HP	SOUTHWEST REGIONA	LICHTICE	
(8) WATER LEVELS: Land-surface elevation above mean sea level			
4.6			
Static level . 40			
Artesian water is controlled by. (Cap, valve, etc.)			
		<u> </u>	. <u>l</u>
(9) WELL TESTS: Drawdown is amount water level is lowered below static level	Work started 1-24 19 60 Completed	4-28	<u>19</u> 80
Was a pump test made? Yes □ No □ 11 yes, by whom?	WELL DRILLER'S STATEMENT:		
Yield: gal./min. with ft. drawdown after nrs.	· · · · · ·		n ronost ic
4 0 H	This well was drilled under my jurisdiction true to the best of my knowledge and belief	n and th	s report is
	· 1		
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)  Time Water Level   Time Water Level   Time Water Level	(Person, firm, or corporation)	(Tabe or	brane,
	Address 11302 Burnham Dr. 174	Gig H	arbor,
	[Signed] Wall Driller	By:	P. Mille
Date of test  Bailer test 10 gal/min with 20 ft drawdown after 2 hrs  Artesian flow g.p.m. Date	007 07 84EE to 07		
Temperature of water Was a chemical analysis made? Yes [] No [	507		

File Original and First Copy with Department of Ecology Second Copy—Owner's Copy Third Copy—Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

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• •		AZAGE
ORT,	4	W. C. S. W.
on is	.≅	
Water Right Pen	 mit No	

<del></del>	OWNER: Name -Toba 11. rry	ICH The Control of the United	101.
(1)		S'/ U.S. /2 2/	
(2)	LOCATION OF WELL: County Cree The +Ch	Still No Mark Sec. 1 Take N. R.	W.M. 336
(28)	STREET ADDDRESS OF WELL (or nearest address)	- British and the second of th	
(3)	PROPOSED USE:  ☐ Irrigation ☐ DeWater ☐ Dewat	(10) WELL LOG OF ABANDONMENT PROCEDURE DESCRIPTION: Describe by color, character, size of material and structure, and thickness of aquifers and the kind and nature of the material in each stratum pen	nd show
(4)	TYPE OF WORK: Owner's number of well	with at least one entry for each change or information.	
(-,	Abandoned C: New well & Method: Dug   Bored	TAC NAL	<u>;</u>
	Abandoned C New well  Method: Dug  Bored  Coble  Driven  Coble  Dr	Shed Brown 2 /	3
	5:4	Hard Pin 13 3	3_
(5)	Jungton of won	SAN + + GIAVIL (5-70-4) 33 3	32
	Drilled 15 teet. Depth of completed well 15 th.	Clay (Blue) 35 /	72
(6)	ا معداد السال السال	March 62 1.	<u>کی ای</u> ارمسے ا
	Casing installed: / Diam. from / It. to // It.	Short + krouth - Ill Co)	<i>3</i> _
	Liner installed		
_	Perforations: Yes New		
	Type of perforator used		
	SIZE of perforations in. by in.		
	perforations from ft. to ft.		
	perforations fromft. toft.		
_	perforations fromf1. tof1.		
	Screens: Yes Kill No		
	Manufacturer's Name COOK  Type STUCKS Model No		
	Diem. 10 Stot size 12 from 175 ft. to 151 ft.		
	DiamSlot elzefromft. toft.		
	Gravel packed: Yes No.K. Size of gravel		
	Gravel placed fromft. toft.		
	Surface seal: Yeak No To what depth? ft.		
	Did any strate contain unusable water? Yes No.		
	Type of water?Depth of strate		
	Method of seating strate off		
(7)			
	type: 546 mars : 44 HP 3/4		
(8)	(14a ) 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1		
	Static level II. genow top of west Date		
	Artesian pressure		1940
-	WELL TESTS: Drawdown is amount water level is lowered below static level	Work started AUG - 30 19/Completed 3 CAT	<u>., 19.7.6.</u>
(9)	Was a pump test made? Yeak No If yee, by whom?	WELL CONSTRUCTOR CERTIFICATION:	
	Yield gal./min. with ft. drawdown elter hrs.	a construction of the construction of the	his well,
_	1		my best
٠	Recovery data (time taken as zero when pump turned cit) (water level measured	knowledge and belief.	
	from well top to water level) Time Water Level Time Water Level Time Water Level	WAR PAP Will Drille -4	
_	<u>6 77 — — — — — — — — — — — — — — — — — —</u>	PERSON, FIRM, OR CORPORATION) (TYPE OR	PRINT)
	2 16	Address Farl Circler	
-	Date of test	(Signed) P. + William License No. 65)	,
	10	(WELL DRILLER)	
	Bailer test gal./min. with tt. grawbown arer tree.  Arriest gal./min. with stem sall st ft. for free.	Contractor's Registration	77
	Artesian (low g.p.m. Date	No. If will life Date	., 18
	Temperature of water Was a chemical analysis made? Yes No.	(USE ADDITIONAL SHEETS IF NECESSARY)	

	WATER WELL STATE OF W	L REPORT StanSHIMBTON Wat	er Right Permit No.	1839 
(1) CHNER: Name STACY BRIAN	144 1611 5	RINACET RD & TAPRNA UA QUA	£5-	
(1) OWNER: Name STACY BRIAN  (2) LOCATION OF WELL: County PIERCE  (2a) STREET ANDRESS OF WELL for mearest address.	ess) 3103 <b>25611 u</b> t w	- 唯 1/4 - 4 1/4 Sec 17	1 22 111 11 22 111	
(3) PROPOSED DSE: BOXESTIC				
(4) TYPE OF HORK: Owner's Mumber of Cif more than one MEM WELL Hethod: AIR ROTAR	well } 	and structure, and show thic and nature of the material i at least one entry for each	n each stratus penetra	aterial the kind ted, with
	mail of the	MATERIAL "	! **	ON ! TO
(6) CONSTRUCTION DETAILS: Casing installed: 6 Dia. from 0 MELDED Dia. from Dia. from Dia. from	ft. to 47 ft. ft. to ft. ft. to ft.	COMPACTED SAMP AND CLAY SEFFAGE SAMB CLAY HARDPAN	2 9 2 2 2 4	2 14 24 25 42 47
Perforations: 40	by in.	! MATER BANG & ERAVEL	47	53
Screens: NO Manufacturer's Mame Type Model No. Diam. slot size from Diam. slot size from	ft. to ft. ft. to ft.			
Gravel packed: MD Size ( Gravel placed from ft. to	. 166			
Surface seals YES  Material used in seal SEMIONITE CLAY Did any strata contain gousable water Type of water?  Method of sealing strata off  (7) PINO: Manufacturer's Mase	hat Jegith? 40 ft.			
The state of the s				
(B) WATER LEVELS:  Land-surface  Above seen per  Affective Pressure  Little Tressure  Little North State  Little S	level die 12/46/96 1 gch die 2/46/96	the short of 1990/00	Completed 12/0	3/90
(9) WELL TESTS: Drawdown is account water le static level. Was a pump test made? NO 11 yes, by wh Yield: gal./min with ft. draw	ivel is lowered below ton?	WELL CONSTRUCTOR CERTIFICATION of this well,	TION: cept responsibility for and its compliance wi	r con- th all rials used
Recovery data Time Water Level Time Water Level	l Time Water Level	MANE RICHARDSON WELL DRILL (Person, fire, or con	IMB poration) (Type or pr	int?
		ADDRESS PO BOX 44427 TAC	IA 98444	

hrs. hrs.

Contractor's Registration No. RICHAN-32108

License No. 0284

Date 01/22/91

est //
gal/min. 25 ft. drawdown after 1 hrs.
gal/min. w/ stem set at ft. for hrs.
g.p.s.
Was a chemical analysis made? MO

÷...

Date of test f f
Bailer test 30 gal/min
Air test gal/min. (
Artesian flow g.p.
Temperature of water

ECY 050-1-20 (9/93) \* \* I

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## **WATER WELL REPORT**

Start Card No. <u>W052689</u>

STATE OF WASHINGTON

UNIQUE WELL I.D. . ABP815

Thin	S Copy — Driller's Copy STATE OF W	Water Right Pennit No.
(1)	OWNER: Name PEDRO AND WENDY PINTO Add	Ross 22404 Military Road S., Sea-Tac, WA 98198
(2)	LOCATION OF WELL: County Pierce	- <u>NW 14 NE 14 8ec 17 t 22 k. p 2E w.m.</u>
<b>(2a)</b>	STREET ADDRESS OF WELL (or represt address) off Crescent Va	lley Road
(3)	PROPOSED USE: Domestic Industrial   Municipal	(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION
	☐ DeWater Test Well ☐ Other ☐	Formation: Describe by color, character, size of material and structure, and show thickness of equities and the kind and nature of the material in each stratum penetrated, with at least one only for each
(4)	TYPE OF WORK: Owner's number of well (if more than one)	change of information.  MATERIAL FROM TO
	Abendoned New well () Method: Dug Bored Despensed Cable Driven	
	Reconditioned Retary () Jetted	Brown topsoil 0 4
(5)	DIMENSIONS: Diameter of wall 6 inches.	Gray hardpan 4 27
	Drilled 178 feet. Depth of completed well 178 ft.	Gray silty sand & gravel 27 69 Gray hardpan 69 93
(6)	CONSTRUCTION DETAILS:	Gray hardpan 69 93 Gray silty sand & gravel 93 131
<b>\-</b> /	Casing installed: 6 Diam. from 0 ft. to 178 ft.	Gray hardpan 131 164
	Welded Diem. from th. to t.	Gray clay w/gravel 164 167
	Threaded Dism. from tt. to tt.	Gray silty coarse sand &
	Perforations: Yes No X	gravel, H20 167 178
	Type of perforator usedin. byin.	
	perforations from th. to ft.	
	perforations from ft. to ft.	
	Screens: Yes No X	
	Manufacturer's Name	v= v3
	Type         Model No.           Diam.         ft. to   ft. to	- <del>2</del> 2 3 2
	Diam. Slot size from ft. to ft.	
_	Gravel packed: Yes No XX Size of gravel	
	Gravel placed fromft. toft.	, vi
	Surface seal: Yes X No To what depth? 18 t.	
	Material used in seatBentonite	
	Did any strata contain unusable water? Yes No X  Type of water?	
	Nethod of sealing strate off	
(7)	PUMP: Manufacturer's Name Goulds Type: submersible 10GS10 M.P. 1	
<del></del>		Work Started 4/26/95 ,19. Completed 4/27/9519
(8)	WATER LEVELS: Land-autriaco elevation above mean sea level	Train district
	Artesian pressure the, per aquare inch Date	WELL CONSTRUCTOR CERTIFICATION:
	Artesian water is controlled by(Cap, valve, etc.)	I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and
(9)	WELL TESTS: Drawdown is amount water level is lowered below static level	the information reported above are true to my best knowledge and belief.
• •	Was a pump test made? Yes X No 11 19 yes, by whom? Gresham Yeld: 15 cal /min, with 18 tt. drawdown after 2 hrs.	NAME Gresham Well Drilling Inc.
		3105 NW Lakeness Rd., Poulsbo, WA 98370
	97 YI 68 M	
_	Recovery data (time taken as zero when pump turned off) (water level measured from wall	(Signed) License No. 0761
1	top to water level) Time Water Level Time Water Level Time Water Level	Comments
_	Full recov. in 5 min.	Contractor's Registration GRESHWD055BC Date 5/04/9519
	Date of test 5/02/95	(USE ADDITIONAL SHEETS IF NECESSARY)
	Bailer testgal./min. withtt. drawdown afterhrs.	Ecology is an Equal Opportunity and Affirmative Action employer. For spe-
	Airtest 20+ gail/min. with atem set at 170 ft. for 1 hrs.  Artesian flow g.p.m. Date	cial accommodation needs, contact the Water Resources Program at (206)
	Temperature of water 50 Was a chemical analysis made? Yes 2 No	407-6600. The TDD number is (206) 407-6006.
		<b>A</b>

File Original and First Copy with Department of Ecology Second Copy — Owner's Copy

## **WATER WELL REPORT**

Start Card No. W053930

UNIQUE WELL LD. . ABP828

	nd Copy — Owner's Copy I Copy — Driller's Copy STATE OF V	VASHINGTON Water Right Permit No
(1)	OWNER: Name MARK KNOWLES Add	21600 24TH AVE.S.#E101, DES MOINES.WA 98198
(2) (2a)	LOCATION OF WELL: County PIERCE STREET ADDRESS OF WELL (or negrees address) 15821 28TH AVE	. NW 1M NE 14 Sec 17 t 22 N.R 2E W. NUE NW, GIG HARBOR
(3)	PROPOSED USE:	(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION  Formation: Describe by color, character, size of material and structure, and show thickness of equits and the kind and nature of the material in each stratum penetrated, with at least one entry for each
(4)	TYPE OF WORK: Owner's number of well (If more than one)	change of information.  MATERIAL FROM TO
	Abandoned New weil	OVERBURDEN 0 4
(5)	DIMENSIONS: Diameter of well 6 inches.  Drafted 119 feet. Depth of completed well 119 ft.	GRAY HARDPAN         4         28           GRAY SAND & GRAVEL         28         52
(6)	CONSTRUCTION DETAILS:  Casing Installed: 6 Diam. from 0 It. to 119 It.  Wolded 2 Diam. from It. to It.  Liner installed Diam. from It. to It.	BLUE CLAY 52 78 GRAVEL, H2O - 2GPM 78 79 GRAY HARDPAN 79 112 GRAVEL, H2O 112 119
	Perforations:         Yes         No         No           Type of perforator used         In. by	
	Screens: Yes No XX.  Manufacturer's Name  Type	
	Surface seet: Yes  No  To what depth? 18 t.  Material used in seal BENTONITE  Did any strata contain unusable water? Yes  No    Type of water? Depth of strata  Method of sealing strata off	25
(7)	PUMP: Manufacturer's Name GOULDS Type: SUBMERSIBLE TOGSTO H.P. 1	
(8)	WATER LEVELS: Land-surface elevation above masn sea love!  Static fevel 72	Work Started 6/07/95 19. Completed 6/07/95 19  WELL CONSTRUCTOR CERTIFICATION:  I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and
(9)	WELL TESTS: Drawdown is amount water level is lowered below static level  Was a pump test made? Yes XX No til yes, by whom? GRESHAM  Yield: 15 gal./min. with til. drawdown efter hrs.  """"  """"  """"  """"  """  """  "	the information reported above are true to my best knowledge and belief.  NAME GRESHAM WELL DRILLING, INC.  (PERSON, FIRM, OR COMPORATION) (TYPE OR PRINT)  Address 3105 NW LAKENESS RD., POULSBO, WA 98370  (Signed) (WELL DRILLER)  License No. 0761
_	FULL RECOV. IN 2 MIN. Water Level Time Water Level	Contractor's Registration CDFCHLIDOSSRC 6/16/QS

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

(USE ADDITIONAL SHEETS IF NECESSARY)

Date of test

6/09/95

gal./min. with stem set at

gal./min. with

ft. drawdown alter 115 ft. for

etad .m.q.g

50 Was a chemical analysis made? Yes

hrs.

No 🗆

WATER WELL REPORT	CURRENT Notice of Intent No. W661595
Provided to the copy - Ecology, 2nd copy - owner, 3rd copy - driller	Unique Ecology Well ID Tag No. #13 # - 0 6 4
Construction/Decommission ("x" in circle)	
© Construction	Water Right Permit No.
O Decommission ORIGINAL CONSTRUCTION Notice  127549 of Intent Number	Property Owner Name JOE /AW
PROPOSED USE: Domestic Industrial Municipal	Well Street Address 18826 28 BREMIN,
☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other	City GLO WALBOR County: PIERCE
TYPE OF WORK: Owner's number of well (if more than one)	City Cotto Protection Country: Protect
New Well Reconditioned Method Dug Bored Driven	Location NE1/4-1/4 NW1/4 Sec 17 Twn 22 R 2 (EWM) circle
☐ Deepened	Lat/Long: Lat Deg Lat Min/Sec
DIMENSIONS: Diameter of well 6 inches, drilled 102 ft	(s,t,r still REQUIRED) Long Deg Long Min/Sec
Depth of completed well 103 ft	Tax Parcel No. <u>6277171054</u>
CONSTRUCTION DETAILS Casing	CONSTRUCTION OR DECOMMISSION PROCEDURE
Casing Welded " Diam from ft. to ft. to ft. to ft. to ft. to ft.	Formation Describe by color, character, size of material and structure, and the
Threaded Bram. from ft. toft.	kind and nature of the material in each stratum penetrated, with at least one
Perforations: Yes No	entry for each change of information Indicate all water encountered (USE ADDITIONAL SHEETS IF NECESSARY.)
Type of perforator used	MATERIAL FROM TO
SIZE of perfsin byin and no of perfsfromft toft	Top soil 0 4
Screens: Yes No K-Pac Location 78	clay-gravel 4 11
Manufacturer's Name Johnson	clay-gravel-boulder 11 16
Type Stain less Steel Model No Diam 5" Slot Size 10 from 102 ft to 96 ft	brown sand 16 47
DiamSlot Sizefromft toft	gravel-sand-clay 47 83
Gravel/Filter packed: Yes No Size of gravel/sand	grav slav - sand 83 85
Materials placed fromft toft.	gravel-sand-clay 85 96.
Surface Seal: Yes No. To what depth? 19 ft	send oray ws. 96 102
Materials used in seal Benjounile	Jene gray was
Did any strata contain unusable water? Yes No	
Type of water?Depth of strata	
Method of sealing strata off	
PUMP: Manufacturer's Name	
Type H P	
WATER LEVELS: Land-surface elevation above mean sea levelft.	
Static levelft below top of well Date  Artesian pressurelbs per square inch Date	
Artesian water is controlled by	
(cap,valve, etc)	
WELL TESTS: Drawdown is amount water level is lowered below static level	
Was a pump test made? The Yes No If yes, by whom?  Yield 10 gal/min with 25' ft drawdown after 2 hrs	
Yield	DDOD
Yield gal/min with ft drawdown after hrs	KECEIVED
Recovery data (time taken as zero when pump turned off)(water level measured from well top to water level)	
Time Water Lavel Time Water Lavel Time Water Lavel	JAN 1 6 2003
I have the same to	
	Washington State
Date of test	Department of Ecology
Airtestgal/min with stem set atft forbrs	
Artesian flowg p m Date Temperature of waterWas a chemical analysis made?  Yes No	Start Date 2 4 02 Completed Date 12/23/01
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsible washington well construction standards. Materials used and the information representation.	assimility for construction of this well, and its compliance with all ported above are true to my best knowledge and belief
■ Driller □ Engineer □ Trainee Name (Print) Bruce Lewis	Drilling Company HAN BOR WALD (B) LONG
Driller/Engineer/Trainee Signature Buck Louis	10. 7. 00.0
Driller or Trainee License No. 2627	- Address (NO) 180x 330
Direct of 1 fairee License Ino	City, State, Zip BUR/BU WA. 98322
If trainee, licensed driller's	Contractor's Registration Notar Bo Re114046 ate 1/13/03
Signature and License no	,

WATER WELL REPORT	Notice of Intent No. W/62 612	
Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller	Unique Ecology Well ID Tag No. ACE	<i>5</i> 33
Construction/Decommission ("x" in circle)		***
© Construction O Decommission ORIGINAL CONSTRUCTION Notice	Water Right Permit No.	
[30700] of Intent Number	Property Owner Name ANN Lem 1	<u>e uX</u>
PROPOSED USE: Domestic Industrial Municipal DeWater Irrigation Test Well Other	Well Street Address 15625 Oves	Centry DUN
TYPE OF WORK: Owner's number of well (if more than one)	City G 19 Hawh 19 County: 1 Location NE 1/4 1/4 NE 1/4 Sec 17 Tw	71erce
New Well Reconditioned Method Dug Bored Driven	Location NE 1/4 1/4 NE 1/4 Sec 17 Tv	vn 22 R 2 EWM
Deepened	Lat/Long: Lat Deg L	· WWM
DIMENSIONS: Drameter of well	(s,t,r still	
Depth of completed well 2/8 ft	REQUIRED) Long Deg L Tax Parcel No. 0288171065	
CONSTRUCTION DETAILS Casing X Welded ft to <u>2/3</u>		
Installed: Liner installed Diam fromft to	Formation: Describe by color, character, size of mat	ternal and structure, and th
Threaded Diam fromft to	ht. kind and nature of the material in each stratum pene entry for each change of information indicate all wa	ater encountered
Perforations: Yes No	(USE ADDITIONAL SHEETS IF NECESSARY)	
Type of përforator usedft toft toft toft.	MATERIAL AT A 2 /	FROM TO
Screens: A Yes No K-Pac Location	Top soil	0 1
Manufacturer's Name	gravely Handpan	5 40
Type	Hund Daza	60 88.
Diam Slot Size from ft to ft	Sand	88 91
Gravel/Filter packed: Yes No Size of gravel/sand	Clayish Handpan + grand	91 194
	Fine Sand	194 210
Materials placed fromft toft.  Surface Seal: ☑Yes ☐No To what depth?ftft	Band	210 218
Materials used in seal Holeplug  Did any strata contain unusable water? Yes No	<del>                                     </del>	<del></del>
Type of water Depth of strata		
Method of sealing strata off	RECEIVED	<del> </del>
PUMP: Manufacturer's Name Gould	APR 0.4.2003 ST	
Type <u>Submersible</u> HP 3/4		<del>B</del>
WATER LEVELS: Land-surface elevation above mean sea levelft Static level92,5ft below top of well Date3/5/03	DEPARTMENT OF ECOLOGY CT	1
Artesian pressurelbs per square inch Date	BC BC	
Artesian water is controlled by (cap,valve, etc.)	500	
WELL TESTS: Drawdown is amount water level is lowered below static level		<u>ö</u> .
Was a pump test made? Yes \( \sum_{No} \) If yes, by whom? \( \textbf{hy} \) \( \text{Drillex} \)		
Yield 6 gal/mm with 45 ft. drawdown after hrs Yield gal/min with ft drawdown after hrs		
Yield:gal/min withtt drawdown afterhrs		
Recovery data (time taken as zero when pump turned off)(water level measured from well top to water level)		
Time Water Level Time Water Level Time Water Level		
6.60 137 2010 92.5		
Date of test		
Bailer testhrshrs		
Artestgal/min with stem set atft forhrs Artesian flowg p m Date		
Temperature of waterWas a chemical analysis made? ☐ Yes ☐ No	Start Date 2/17/03 Completed Date	<u> 5/4/03                                   </u>
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept resp Washington well construction standards. Materials used and the information	reported above are true to my best knowledge and	d belief.
DiDniler DEngineer DTrainee Name (Print) Wesley Clessher	Drilling Company Wes Cless	nev-Drillin
Driller/Engineer/Trainee Signature Wesley Messure	— Address <u>Po Box 487</u>	
Driller or Trainee License No. <u>0/54</u>	_ City, State, Zip Burley Wa.	·983ZZ
If trainee, licensed driller's	Contractor's Registration No WESC Die 681 Post	_
Signature and License no.	Registration No. 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	(e <del>*/ 0 / 0 . 5</del> .

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WATER WELL REPORT	CHRRENT		
Original & 1 <sup>st</sup> copy - Ecology, 2 <sup>nd</sup> copy - owner, 3 <sup>rd</sup> copy - driller	CURRENT		
Construction/Decommission ("x" in circle)  Construction	Notice of Intent No. WEO7604		
☐ Construction 20213	Unique Ecology Well ID Tag No. BAT439		
Decommission ORIGINAL INSTALLATION	Water Right Permit No.		
Notice of Intent Number  PROPOSED USE: ☑ Domestic ☐ Industrial ☐ Municipal	Property Owner Name WILLIAM SARNO		
DeWater I Irrigation Test Well Other	Well Street Address15905 28TH AVE NW		
TYPE OF WORK: Owner's number of well (if more than one)	City GIG HARBOR County PIERCE		
New well	•		
☐ Deepened ☐ Cable ☒ Rotary ☐ Jetted  DIMENSIONS: Diameter of well 6 inches, drilled 148 ft.	Location NW1/4-1/4 NE1/4 Sec 17 Twn 22 R 2E (s, t, r Still REQUIRED)	EWM I	_
Depth of completed well 148ft.	(3) (1 · Sim regerres)		м 🗆
CONSTRUCTION DETAILS	Lot/Long Lot Dog Lot Min/Sec		
Casing Welded 6" Diam. from 0 ft. to 233 ft.  Installed: Liner installed" Diam. fromft. toft	Lat/Long Lat Deg Lat Min/Sec Long Deg Long Min/Sec		
☐ Threaded" Diam Fromft. toft.	Tax Parcel No. (Required)0222175005		
Perforations: ☐ Yes ☒ No			
Type of perforator usedin. byin, and no. of perfsfromft. toft.	CONSTRUCTION OR DECOMMISSION PRO Formation: Describe by color, character, size of material and struct	cture, and the	
Screens:   Yes   No     K-Pac   Location	nature of the material in each stratum penetrated, with at least one of information. (USE ADDITIONAL SHEETS IF NECESSARY		h change
Manufacturer's Name JNSN	MATERIAL	FROM	то
Type SS Model No. TELES	PIPE STICK UP	0	1
Diam. <u>5"Slot size 18 from 143</u> ft. to <u>148</u> ft.  DiamSlot size from ft. to ft.	BROWN SAND, CLAY, GRAVEL	1	16
Gravel/Filter packed:  Yes No Size of gravel/sand	GRAY SAND, GRAVEL, WET BROWN SAND, GOME GRAVEL, WET	16	21 41
Materials placed fromft. toft.	GRAY SAND, CLAY, GRAVEL,	41	7!
Surface Seul:   Yes □ No To what depth? 18ft	SEAMS WET		61
Material used in seal BENTONITE	GRAY SILT, SAND, GRAVEL	61	85
Did any strata contain unusable water? ☐ Yes ☒ No	GRAY SAND, GRAVEL, SEAMS WATR GRAY SILT, SAND, GRAVEL, CLAY	109	109
Type of water? Depth of strata	GRAY SAND, GRAVEL, CEAT	140	148
Method of sealing strata off			
PUMP: Manufacturer's Name			
WATER LEVELS: Land-surface elevation above mean sea level fl.		<del></del>	
Static level 83ft below top of well Date 11/13/2007		<del> </del>	
Artesian pressure lbs. per square inch Date			
Artesian water is controlled by (cap, valve, etc.)		<u> </u>	
WELL TESTS: Drawdown is amount water level is lowered below static level		<del> </del>	ļ
Was a pump test made?  Yes  No If yes, by whom?		<del> </del>	
Yield:hrs.			
Yield:gal./min. withft. drawdown afterhrs.  Yield:gal./min. withft. drawdown afterhrs.	FED FOR ALL INSTALL	<del> </del>	ļ <u> </u>
Recovery data (time taken as zero when pump turned off) (water level measured from well	PECEW		-
top to water level) Time Water Level Time Water Level Time Water Level	- 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
Time Water Level Time Water Level Time Water Level	000 1030	17	
	737m - to	1	<del> </del>
Date of test	Washington S		
Bailer test 15 gal./min. with 24ft drawdown after 1hrs.	Department of E	<del>cology</del>	
Airtestgal./min. with stem set atft. forhrs.		1	
Artesian flowg.p.m. Date	Complete Date	11/12/2007	
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No	Start Date 11/7/2007 Completed Date	11/13/200	!/
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept response construction standards. Materials used and the information reported above are true		ıll Washingt	ton well
☐ Driller ☐ Engineer ☐ Trainee Name (Print ) JOHN SULLIVAN	Drilling Company NICHOLSON DRILLING INC		
Driller/Engineer/Trainee Signature	Address PO BOX 123		
Driller or trainee License No. 2218	City, State, Zip PORT ORCHARD	, WA	, 98366
IF TRAINEE: Driller's License No:	Contractor's		
Driller's Signature:	Registration No. NICHOD11370M Date	11/30/2007	

ECY 050-1-20 (Rev 3/05)



WATER WELL REPORT	CURRENT Notice of Intent No. W216866	<u> </u>	
Original & 1 <sup>st</sup> copy - Ecology, 2 <sup>nd</sup> copy - owner, 3 <sup>rd</sup> copy - driller			_
Construction/Decommission ("x" in circle)	Unique Ecology Well ID Tag No. APR	140	
© Construction	Water Right Permit No. Property Owner Name Swen Weinn	nann	
O Decommission ORIGINAL INSTALLATION Notice	Property Owner Name		
4000	Well Street Address 15515 30±h		
PROPOSED USE: 12 Domestic	City Gig Harbor County Pie		
TYPE OF WORK: Owner's number of well (if more than one)	Location SE 1/4-1/4 NW 1/4 Sec 20 Twn 22 N		circle one
New well ☐ Reconditioned Method: ☐ Dug ☐ Bored ☐ Driven	Lat/Long (s, t, r Lat Deg Lat	Min/Sec	
☐ Deepened ☐ Cable ☐ Rotary ☐ Jetted	C.III P. P. C.IIIP P.D.		
DIMENSIONS: Diameter of well 6 inches, drilled 160 ft.  Depth of completed well 160 ft.	Eong Deg Dor	10-20	
CONSTRUCTION DETAILS	Tax Parcel No. 0222171051		
Casing 2 Welded 6 "Diam from +1 ft. to 155 ft. Installed: Liner installed "Diam from from ft. to ft.	CONSTRUCTION OR DECOMMISSION	PROCEDUE	PF.
☐ Threaded Th. to ft. to ft.	Formation: Describe by color, character, size of material and		
Perforations:	nature of the material in each stratum penetrated, with at least information. (USE ADDITIONAL SHEETS IF NECES		h change of
SIZE of perfs in. by in. and no. of perfs from ft. toft.	MATERIAL MATERIAL	FROM	то
Screens: \$\overline{\pi}\$ Yes \$\overline{\pi}\$ No \$\overline{\pi}\$ K-Pac Location \$\overline{154}\$	Brown sand	0	37
Manufacturer's Name Johnson			
Type Stainless steel Model No. —  Diam. 5 Slot size 14 from 155 ft. to 160 ft.  Diam. Slot size from ft. to ft.	Grey till	37	132
Gravel/Filter packed: □ Yes ᡚ No □ Size of gravel/sand	Grey clay	132	136
		132	150
Surface Seal: Ty Yes No To what depth? 18 ft.	Grey sand	136	145
Material used in seal <u>Bentonite</u> Did any strata contain unusable water? □ Yes ☑ No			
Type of water? Depth of strata	Grey sand w/b	145	160
Method of sealing strata off	-Grey tight sand	160	
PUMP: Manufacturer's Name Goulds Type: _Submersible H.P ]	ore, ergne sand	100	
WATER LEVELS: Land-surface elevation above mean sea levelft_			
Static level 108 ft. below top of well Date 10/25/07		n	
Artesian pressurelbs. per square inchr Date	RECEIVE		
Artesian water is controlled by(cap, valve, etc.)	· · · · · · · · · · · · · · · · · · ·	1	
WELL TESTS: Drawdown is amount water level is lowered below static level	NOV 1 4 200 DEPT. OF EGO	LOGY	
Was a pump test made? So Yes	OF EGU	000	
Yield: gal./min. with ft. drawdown after hrs.	DEL		
Yield: gal/min. with ft. drawdown after hrs.  Recovery data (time taken as zero when pump turned off) (water level measured from well			
top to water level)			
Time   Water Level   Time   Water Level   Time   Water Level			
1 m 111'			
Date of test			
Bailer test 10 gal./min. with 8 ft. drawdown after 2 hrs.  Airtest gal./min. with stem set atft. forhrs.			
Artesian flowg.p.m. Date			
Temperature of water Was a chemical analysis made? ☑ Yes ☐ No			
		ed Date 10/	
WELL CONSTRUCTION CERTIFICATION: I constructed and/or acc	ept responsibility for construction of this well, and	l its complian	ice with all
Washington well construction standards. Materials used and the information Driller Dengineer Dengineer Name (Print) Matt Olsen		id beller.	
Driller/Engineer/Trainee Signature	Address PO Box 1554		
Driller or trainee License No. 2337		WA 9836	56
If TRAINEE,	Contractor's Registration No. OLSEND101LJ	_ 11	10.107
Driller's Signature		_ Date/ Equal Opportuni	9/07_
		Man Obbourn	., Linproyer.

The Well Log Data and Image are 'As Is' with NO Warranty. Well Log ID:

339850

le Original and First Co	sv witti	
spertment of Ecology	_ •	

### **WATER WELL REPORT**

	OF WASHINGTON Water Right Permit No.
1) OWNER: Name Hall Stepping, I block	Marine 4811 No. Highline ; Tacona WK
2) LOCATION OF WELL: County Frence	
2a) STREET ADDRESS OF WELL (or nearest address) 3025 / 1565	est. N.W. dig Harbor WA
3) PROPOSED USE: Domestic Industrial   Municipal	(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION
Irrigation   DeWater Test Wet   Other	Formation: Describe by color, character, size of material and structure, and show trickness of aguite
A) TYPE OF WORK. Owner's number of wall	and the kind and nature of the material in each stratum penatrated, with at least one entry for oal change of information.
Abandoned New well 2 Method: Dug Bored	MATERIAL FROM TO
Desponed Cable Driven	Tes 821 0 2
Reconditioned Retary Jetted 5	Box Jands some Traces of Box Sitts 2 11
J Dimilitary 2010	
Drittedteel. Depth of completed well	3. John Jam Sands Stells 31 96
6) CONSTRUCTION DETAILS:	Grades & Ends water Enrice 36 53
Casing Installed: Dram. from +2_ t to 53	
Welded Dam. from A. to Liner installed Dam. Treaded Diam. from Number 1. to	n.
Perforations: Yes No 🛣	
SIZE of perforations In. by	
perforations from ft. to	-h
perforations from fit to	_n_
perforations from tt. to	_h_
Screens: Yes No 🔀	
Manufacturer's Name Model No	- <del>                                    </del>
Diam. Slot size from th. to	
Dism. Stot sizetromtt. to	
Gravel packed: Yes No 🗵 Size of gravel	
Gravel placed from	. R
Burface seal: Yes No . No . To what depth?	1 5 M
Material used in seal	- <del>                                    </del>
Citid any strata contain unusable water? Yes	
Method of seating strate off	
7) PUMP: Manufacturer's NameH PH P	
8) WATER LEVELS: Land-surface obvestor	
State level 22 nt. below top of well Date Not. 3.4	2300
Artesian pressure bis per square inch Date	
Artesian water is controlled by(Cap, valve, ctc.)	Wind Strengt May 2 19 Completes NOV S 19 9
9) WELL TESTS: Organdown is amount water level is lowered below static level	Wark Started NV 2 19 Completed VVV 5 , 19 9
Was a pump test made? Yes No If yes, by whom?	WELL CONSTRUCTOR CERTIFICATION:
Yieldgel./min. withft. drawdown after	hrs. I constructed and/or accept responsibility for construction of this well, and its
19 19	compliance with all Washington well construction standards. Materials used and this information reported above are true to my best knowledge and belief.
Recovery data (time taken as zero when pump turned off) (water level measured from w	HAVE HALF TESTING TWO
top to water level)	(PERSON FRACON CORPORATION) (TYPE CER PRINT)
Time Water Level Time Water Level Time Water Level	Address 106 21 Todd Kd. / Luva //410
	(Signed) (Sand 1977) License No. 2/48
	WELLORETEN.
Date of test	hrs. Contractor's
<u> </u>	hrs. No. 140177108707 Date 1001 3 19 55
Artesian flow	(USE ADDITIONAL SHEETS IF NECESSARY)

Original & 1st copy - Ecology, 2nd copy - owner, 3nd copy - driller
ECOLOGY Construction/Decommission ("x" in circle)
Construction
Decommission ORIGINAL INSTALLATION
Notice of Intent Number WE21844
PROPOSED USE: Domestic   Industrial   Municipal   DeWater   Irrigation   Tost Well   Other
☐ DeWster ☐ brigation ☐ Test Well ☐ Other
TYPE OF WORK: Owner's number of well (if more than one)
New well Recombitioned Method: Duz Bored Driven
☐ Deepened ☐ Cable  ☐ Retary ☐ Jetted
DIMENSIONS: Diameter of well 6 inches, drilled 98 ft.
Depth of completed well 98 ft.
CONSTRUCTION DETAILS
Casing Welded 6 Diam from 0 ft to 96 ft.
Installed: Liner installed Diam. from ft. to ft.
Threaded Diam. Prom fl. to fl.
Perforations: Yes No
Type of perforator used
SIZE of perfsin. byin. and no. of perfsfromfl. tofl.
Screens: Yes No K-Pac Location
Manufacturer's Name JOHNSON
Type STAINLESS STEEL Model No. TELESCOPE
Type STAINLESS STEEL Model No. TELESCOPE  Diam 6 Slot size 16 from 93 ft. to 92 ft.
Diam. Slot size from ft. to ft.
Gravel/Filter packed: Tyes 🖪 No Size of gravel/sand
Materials placed fromft. toft.
Surface Seal: W Yes No To what depth? 18 ft.
No. of the control of
Did any strata contain unusable water?
Type of water? Depth of strata
Type of water? Depth of struta  Method of sealing strata off
PUMP: Manufacturer's Name
Туре: Н.Р
WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 40 ft. below top of well Date
Artesian pressure lbs. per square inch Date
Artesian water is controlled by
WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? ☐ Yes
Yield: gal/min, with fl. drawdown after brs.
Yield:gal/min, withft. drawdown afterhrs.
Yield; gal/min. with ft. drawdown after brs.
Recovery data stime taken as zero when pump turned aff) (water level measured from
well top to water level)
Time Water Level Time Water Level Time Water Level
Date of test
Bailer test 10 gal/min. with 9 ft. drawdown after 1 brs.
Airtestgal/min. with stem set atft. forhrs.
Artesian flow g.p.m. Date
· · · · · · · · · · · · · · · · · · ·
Temperature of water Was a chemical analysis made? Tyes M No

WATER WELL REPORT

### CURRENT

otice of Intent No. WE21844	** - *** - * * * * * * * * * * * * * *	
nique Ecology Well ID Tag No. BHY 098		
ater Right Permit No.		
operty Owner Name David and Liz Stanton		
cli Street Address 2811 159th ST CT NW		
ity Gig Harbor County Pierce		
ocation ne 1/4-1/4 ne 1/4 Sec 17 Twn 22 R	2E PW	M (M)
s, t, r Still REQUIRED)	O:	<b>r</b> _
Lat/Long	WW	M 🗆
Lat Deg Lat Mir	/Sec	
Long Deg Long M	lin/Sec	•
Tax parcel No. (Required) <u>02217</u> 5008		
CONSTRUCTION OR DECOMMISSIO	N DDOCKIN	TOP
Formation: Describe by color, character, size of n	naterial and str	veture,
and the kind and nature of the material in each str least one entry for each change of information. (		
SHEETS IF NECESSARY.)		
MATERIAL	FROM	то
Pipe stick up Brown grey fill	1	3
Grey sand gravel clay wet	3	16
Grey sand gravel water	16	34
Grey sand gravel clay wet	34	77
Grey sand gravel water	77	98
t		
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DEC	EIVE	7
NLC NLC	LIAL	.0
14.11	0 = 0046	
	27 2018	
WA State		
of Ecole	gy (SW	RO)
Start Date 01/10/2016 Completed Date 01	/20/2016	_
lity for construction of this well, and its compliance my best knowledge and belief.	with all Wash	ington well

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Driller Engineer Trainee Name Nic Sample	Drilling Company Nicholson Drilling INC.
Driller/Engineer/Trainee Signature	Address PO BOX 123
Driller or trainee License No. 2770	City, State, Zip Port Orchard, WA, 98367
IF TRAINEE: Driller's License No:	Contractor's
Driller's Signature:	Registration No. NICHODI137OM Date 02/15/2016

ECY 050-1-20 (Rev 02-2010) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program at 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Driller/Engineer/Trainee Signature

Driller or trainee License No. 2770

IF TRAINEE: Driller's License No:

- 0

WATER WELL REPORT

	2E EW OI WW //Sec ON PROCEDURATE and stratum penetrate	M =
reet Address  2917 159TH ST CT NW  IG HARBOR  County PIERCE  In awl/4-1/4 ne 1/4 Sec 17 Twn 22 R  Still REQUIRED)  /Long  Deg Lat Min parcel No. (Required) 0222175007   CONSTRUCTION OR DECOMMISSIO mation: Describe by color, character, size of m the kind and nature of the material in each stre at one entry for each change of information. (U EETS IF NECESSARY.)  MATERIAL Pipe stick up  Grey sand gravel clay wet  Grey clay  Brown sand silt wet  Brey sand gravel clay  Grey clay  Grey clay  Grey sand gravel clay  Grey sand gravel clay  Grey sand gravel clay  Grey clay  Grey sand gravel clay	ON PROCEDUM atterial and stratum penetrate USE ADDITION 13 24 33 109 136	JRE ucture, d, with at INAL TO 1 13 24 33 109 136 145
reet Address  2917 159TH ST CT NW  IG HARBOR  County PIERCE  In awl/4-1/4 ne 1/4 Sec 17 Twn 22 R  Still REQUIRED)  /Long  Deg Lat Min parcel No. (Required) 0222175007   CONSTRUCTION OR DECOMMISSIO mation: Describe by color, character, size of m the kind and nature of the material in each stre at one entry for each change of information. (U EETS IF NECESSARY.)  MATERIAL Pipe stick up  Grey sand gravel clay wet  Grey clay  Brown sand silt wet  Brey sand gravel clay  Grey clay  Grey clay  Grey sand gravel clay  Grey sand gravel clay  Grey sand gravel clay  Grey clay  Grey sand gravel clay	ON PROCEDUM atterial and stratum penetrate USE ADDITION 13 24 33 109 136	JRE ucture, d, with at INAL TO 1 13 24 33 109 136 145
reet Address 2917 159TH ST CT NW  IG HARBOR County PIERCE  In mwl/4-1/4 me 1/4 Sec 17 Twn 22 R Still REQUIRED)  Long Deg Lat Min g Deg Long M  parcel No. (Required) 0222175007  CONSTRUCTION OR DECOMMISSIO mation: Describe by color, character, size of m the kind and nature of the material in each stre at one entry for each change of information. (U EETS IF NECESSARY.)  MATERIAL Pipe stick up Grey sand gravel clay wet Grey clay Brown sand silt wet Brey sand gravel cley damp Grey clay Grey sand gravel clay Grey sand gravel clay Grey sand gravel clay	ON PROCEDUM atterial and stratum penetrate USE ADDITION 13 24 33 109 136	JRE ucture, d, with at INAL TO 1 13 24 33 109 136 145
IG HARBOR County PIERCE  In mwi/4-1/4 ng 1/4 Sec 17 Twn 22 R Still REQUIRED)  /Long Deg Lat Min g Deg Long M  parcel No. (Required) 0222175007  CONSTRUCTION OR DECOMMISSIO mation: Describe by color, character, size of m the kind and nature of the material in each stre at one entry for each change of information. (U EETS IF NECESSARY.)  MATERIAL Pipe stick up Grey sand gravel clay wet Grey clay Brown sand silt wet Brey sand gravel cley damp Grey clay Grey sand gravel clay Grey sand gravel clay	ON PROCEDUM atterial and stratum penetrate USE ADDITION 13 24 33 109 136	JRE ucture, d, with at INAL TO 1 13 24 33 109 136 145
Still REQUIRED)  Long Deg Lat Min. g Deg Lat Min. g Deg Long M  parcel No. (Required) 0222175007  CONSTRUCTION OR DECOMMISSIO mation: Describe by color, character, size of mation: Describe by color, character, size of mation entry for each change of information. (UEETS IF NECESSARY.)  MATERIAL Pipe stick up Grey sand gravel clay wet Grey clay Brown sand silt wet Brey sand gravel cley damp Grey clay Grey sand gravel clay Grey sand gravel clay Grey sand gravel clay	ON PROCEDUM atterial and stratum penetrate USE ADDITION 13 24 33 109 136	JRE ucture, d, with at INAL TO 1 13 24 33 109 136 145
Still REQUIRED)  Lat Ming Deg Lat Ming Deg Long M  parcel No. (Required) 0222175007  CONSTRUCTION OR DECOMMISSIO Mation: Describe by color, character, size of mathe kind and nature of the material in each strate one entry for each change of information. (UEETS IF NECESSARY.)  MATERIAL  Pipe stick up  Grey sand gravel clay wet  Grey clay  Brown sand silt wet  Brey sand gravel cley damp  Grey clay  Grey sand gravel clay  Grey sand gravel clay	ON PROCEDUM atterial and stratum penetrate USE ADDITION 13 24 33 109 136	JRE ucture, d, with at INAL TO 1 13 24 33 109 136 145
Deg Lat Ming Deg Long M Long M parcel No. (Required) 0222175007  CONSTRUCTION OR DECOMMISSIO mation: Describe by color, character, size of m the kind and nature of the material in each stratt one entry for each change of information. (UEETS IF NECESSARY.)  MATERIAL  Pipe stick up  Grey sand gravel clay wet  Grey clay  Brown sand silt wet  Brey sand gravel cley damp  Grey clay  Grey sand gravel clay  Grey sand gravel clay	N PROCEDUM AND	JRE ucture, d, with at NAL  TO 1 13 24 33 109 136 145
Deg Lat Min Long M parcel No. (Required) 0222175007  CONSTRUCTION OR DECOMMISSIO mation: Describe by color, character, size of m the kind and nature of the material in each stratt one entry for each change of information. (UEETS IF NECESSARY.)  MATERIAL  Pipe stick up  Grey sand gravel clay wet  Grey clay  Brown sand silt wet  Brey sand gravel cley damp  Grey clay  Grey sand gravel clay  Grey sand gravel clay	ON PROCEDU naterial and str attrim penetrate JSE ADDITIO FROM 0 1 13 24 33 109 136	URE ucture, dd, with at on the state of the
parcel No. (Required) 0222175007  CONSTRUCTION OR DECOMMISSIO mation: Describe by color, character, size of method the kind and nature of the material in each strate one entry for each change of information. (USETS IF NECESSARY.)  MATERIAL  Pipe stick up  Grey sand gravel clay wet  Grey clay  Brown sand silt wet  Brey sand gravel cley damp  Grey clay  Grey sand gravel clay  Grey sand gravel clay	ON PROCEDI naterial and str attum penetrate JSE ADDITIO FROM 0 1 13 24 33 109 136	TO 1 13 24 33 109 136 145
parcel No. (Required) 0222175007  CONSTRUCTION OR DECOMMISSIO mation: Describe by color, character, size of m the kind and nature of the material in each strat one entry for each change of information. (USETS IF NECESSARY.)  MATERIAL  Pipe stick up  Grey sand gravel clay wet  Grey clay  Brown sand silt wet  Brey sand gravel cley damp  Grey clay  Grey clay  Grey clay  Grey clay  Grey sand gravel cley damp  Grey clay  Grey sand gravel clay	PROCEDO naterial and structum penetrate JSE ADDITION 1 1 13 24 33 109 136	TO 1 13 24 33 109 136 145
CONSTRUCTION OR DECOMMISSIO mation: Describe by color, character, size of m the kind and nature of the material in each stre it one entry for each change of information. (U EETS IF NECESSARY.)  MATERIAL  Pipe stick up  Grey sand gravel clay wet  Grey clay  Brown sand silt wet  Brey sand gravel cley damp  Grey clay  Grey sand gravel clay  Grey sand gravel clay	raterial and stratum penetrate JSE ADDITIO  FROM  0  1  13  24  33  109  136	TO 1 13 24 33 109 136 145
mation: Describe by color, character, size of m the kind and nature of the material in each stra it one entry for each change of information. (U EETS IF NECESSARY.)  MATERIAL  Pipe stick up  Grey sand gravel clay wet  Grey clay  Brown sand silt wet  Brey sand gravel cley damp  Grey sand gravel clay  Grey sand gravel clay  Grey sand gravel clay	raterial and stratum penetrate JSE ADDITIO  FROM  0  1  13  24  33  109  136	TO 1 13 24 33 109 136 145
mation: Describe by color, character, size of m the kind and nature of the material in each stra it one entry for each change of information. (U EETS IF NECESSARY.)  MATERIAL  Pipe stick up  Grey sand gravel clay wet  Grey clay  Brown sand silt wet  Brey sand gravel cley damp  Grey sand gravel clay  Grey sand gravel clay  Grey sand gravel clay	raterial and stratum penetrate JSE ADDITIO  FROM  0  1  13  24  33  109  136	TO 1 13 24 33 109 136 145
the kind and nature of the material in each strat one entry for each change of information. (USETS IF NECESSARY.)  MATERIAL  Pipe stick up  Grey sand gravel clay wet  Grey clay  Brown sand silt wet  Brey sand gravel cley damp  Grey clay  Grey sand gravel clay	### PROM	TO 1 13 24 33 109 136 145
at one entry for each change of information. (UEETS IF NECESSARY.)  MATERIAL  Pipe stick up  Grey sand gravel clay wet  Grey clay  Brown sand silt wet  Brey sand gravel cley damp  Grey clay  Grey clay  Grey sand gravel clay	FROM 0 1 13 24 33 109 136	TO 1 13 24 33 109 136 145
EETS IF NECESSARY.)  MATERIAL  Pipe stick up  Grey sand gravel clay wet  Grey clay  Brown sand silt wet  Brey sand gravel cley damp  Grey clay  Grey sand gravel clay	FROM 0 1 13 24 33 109 136	1 13 24 33 109 136 145
Pipe stick up Grey sand gravel clay wet Grey clay Brown sand silt wet Brey sand gravel cley damp Grey clay Grey sand gravel clay	0 1 13 24 33 109	1 13 24 33 109 136 145
Grey sand gravel clay wet Grey clay Brown sand silt wet Brey sand gravel cley damp Grey clay Grey sand gravel clay	1 13 24 33 109 136	13 24 33 109 136 145
Grey clay Brown sand silt wet Brey sand gravel cley damp Grey clay Grey sand gravel clay	13 24 33 109 136	24 33 109 136 145
Brown sand silt wet Brey sand gravel cley damp Grey clay Grey sand gravel clay	24 33 109 136	33 109 136 145
Brey sand gravel cley damp Grey clay Grey sand gravel clay	33 109 136	109 136 145
Grey sand gravel clay	136	145
Grey coarse sand gravel water	145	151
		201
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WA 9	tate De	partme
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	2/04/16	-
t Date 02/02/16 Completed Date Af		
	art Date <u>02/02/16</u> Completed Date <u>fi</u>	RECEI  JUN 0.9  WA State De of Ecology  art Date 02/02/16 Completed Date: 62/04/16  for construction of this well, and its compliance with all Washington

**CURRENT** 

Date 06/06/2016

Regisfration No. NICHODI1370M Driller's Signature: ECY 050-1-20 (Rev 02-2010) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program at 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Address PO BOX 123

Contractor's

City, State, Zip PORT ORCHARD, WA, 98367